The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXIV. NO. 604 JANUARY 24, 1931 **Prepaid Annual Subscription: United Kingdom, £1.1.0; Abroad, £1.6.0**

Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders, and Postal Orders should be made payable to Benn Brothers, Ltd.*

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Telegrams: "Allangas, Fleet, London." Telephone: City 0244

British Industries Fairs of 1931

THE advance overseas editions of the catalogues of the British Industries Fairs, to be opened in London (Olympia) and Birmingham simultaneously on February 16, are a reminder of the advanced stage that the arrangements have already reached. For the first time the catalogues of the two sections are in the same form, each having a classified index in nine languages: English, French, Spanish, Portuguese, Italian, German, Dutch, Swedish and Danish. The catalogue of the London Section contains descriptions of the exhibits of about 1,200 manufacturers, and the Birmingham entries bring the total to over 2,000. Each section will have more exhibitors and will cover a larger area than in 1930 and the total area of the London Fair will be further increased by the holding of a Cotton Textile Section at the White City, for which a separate catalogue is to be issued. These advance overseas editions are being despatched to 10,000 business firms and potential buyers in Europe, Africa, parts of Asia, North America and the East Coast of South America, all of whom will receive their copies in good time before their departure for the Fair.

As in past years, the special Chemical Section will be held in London. The products of British chemical manufacturers were, in the opinion of many visitors, seen to greater advantage at Olympia last year than in any previous year since the war. The Chemical Section of 1931 will, however, exceed even last year's exhibits, and afford even more convincing proof of the advances in industrial chemistry. The Section will again be located on the ground floor in the grand hall at Olympia, close to the Druggists' Sundries Section, and will include the usual wide range of products.

The arrangements for the Chemical Section will be, as usual, in the care of the Association of British Chemical Manufacturers, and the section will offer inducements for a visit by all interested in chemicals for either research or industrial purposes. The Association will have an office open to deal with inquiries that visitors may wish to make, and overseas buyers will be supplied with the best information available as to British productions. The 1931 edition of the Association's main Directory will be available and should be of special interest to overseas buyers, as it is in six languages—English, French, German, Italian, Portuguese and Spanish. The Association's other Directory of British Fine Chemicals contains a list of over 3,000 fine chemicals and their makers, and affords convincing evidence of the progress of this key industry. The chemical firms exhibiting will number 30 and their exhibits will occupy an area of 12,000 sq. ft.

In accordance with the rule adopted from the beginning, the exhibitors are all manufacturers with works in Great Britain. The greatest advances are shown in the dyestuffs and fine chemical industries, which have received encouragement from legislative action. Whereas before the war the weight of dyestuffs manufactured in this country was 9,114,112 lbs. (in 1913), the amount manufactured in 1929 was 55,785,032 lbs. and the industry supplies 90 per cent. by weight of Great Britain's total colour requirements. The fine chemical industry has achieved similar advance, the number of fine chemical products of to-day comparing strikingly with the few hundred such chemicals made in this country before the war, when nearly the only source of supply was Germany. The chemical exhibits will serve to indicate the very close connection between chemistry and the necessities and luxuries of modern life. They will cover practically all branches of chemistry including heavy chemicals, fertilisers, explosives, coal tar derivatives, fine chemicals of all kinds, medicinal, pharmaceutical, photographic, perfumery and analytical chemicals, solvents, plasticisers, and dyestuffs. Prices, in conformity with the world level, will be lower than in previous years, while unceasing technical control has resulted in appreciably higher standards of purity.

From inquiries made inside the industry, there is every prospect that the chemical exhibition of this year will be more than equal to the high standard of previous years and will attract increasingly wide attention from home and overseas buyers.

A Concession to British Patentees

EXHIBITORS at the British Empire Trade Exhibition at Buenos Aires, to be opened by the Prince of Wales on March 14, and to be visited by Mr. John Benn, the special representative of Benn Brothers, Ltd., will be interested in the substantial concession which the Argentine Government has made to British patentees. By a decree recently issued, the Government undertakes to protect the rights of those wishing to exhibit their inventions and trade marks. The authors of patentable inventions, owners of trade marks, or legitimate successors of either, will enjoy the privilege of their in entions or trade marks in the territory of the Republic without any other formality than that of communicating the details and designs to the Patent and Trade Marks Office of the Ministry of Agriculture, provided that these are already registered in the country of origin and do not conflict with marks and patents registered in the Argentine Republic. This protection will expire three years after the closing of the exhibition in the absence of steps on the part of the owner to secure further protection. The authorities appear to have made the regulations for securing this protection as simple as possible, and their action will remove any cause for fear on the part of exhibitors interested in valuable patents or trade marks.

The National Economy Campaign

THE first step in the new campaign for economy in national and local government expenditure is being taken by the Friends of Economy. Associated with them in the effort are the Economic League, the Individualist Bookshop, the National Citizens' Union and the National Association of Merchants and Manufacturers. The campaign is to be inaugurated at a great economy demonstration in the Great Hall of the Cannon Street Hotel, London, on Tuesday, January 27, at 3 p.m. The chairman will be Mr. Edward Charles Grenfell, M.P. (of Morgan Grenfell and Co., merchants), a director of the Bank of England and of the Sun Insurance Office and the Sun Life Assurance Society. The speakers will include Lord Grey of Fallodon, Sir Robert Horne, M.P., and Sir Ernest J. P. Benn. Lord Grey is a director of the London and North-Eastern Railway Co., and was Secretary of State for Foreign Affairs from 1905 to 1916. Sir Robert Horne was Chancellor of the Exchequer in 1921 and 1922, and is the chairman of the Burma Corporation, the Imperial Smelting Corporation, the National Smelting Co., and the Zinc Corporation. He is in addition a director of banking, insurance, and railway companies. Sir Ernest Benn is chairman of Benn Brothers (publishers of THE CHEMICAL AGE) and Ernest Benn, Ltd., and one of the best known modern writers on economics.

The Friends of Economy do not intend to found a new organisation. They will make use of the machinery of the important organisations named. These bodies have organisations established in practically every important industrial area throughout the country, where propaganda for economy is carried on the whole time. The city meeting is to be the first of a series of big demonstrations, from which the Friends of Economy hope that a powerful national movement will arise. There is every indication of a great volume of support for the movement. The determination of Salford and Leeds to reduce local expenditure are further gratifying signs from the country outside London. Sir Ernest Benn is to address members of the Leeds Chamber of Commerce on January 30 on "Economy," and possibly this event will be linked up with the campaign.

No Dyestuffs Inquiry

IN reply to several questions in the House of Commons on Tuesday, as to whether the Government proposed to make an inquiry into the position of the dyestuffs industry and the operation of the Dyestuffs Act, the President of the Board of Trade stated that the subject had been fully explored already and he saw no advantage in instituting another inquiry. This would appear to indicate an intention to let the matter drift, as the Government, in fact, did all through last year until a critical situation arose almost on the eve of the date for the expiration of the Act. The Government can at least claim to be consistent in their indifference to the industry, and in the weakness with which they have handled the question from the outset. Mr. Brockway attempted to raise the question of an inquiry from the point of view of safeguarding wages, prices, and the national control of the industry. The British dyestuffs industry had some experience of "national control" in the early stages of its reorganisation, and people who have not entirely lost their memories will recognise the futility of the suggestion. The thought of Whitehall controlling research and experiment in the production of vat dyestuffs, for example, is really too comic.

Book Received

PRACTICAL PHYSICAL CHEMISTRY. By Alexander Findlay. London: Longmans, Green and Co. Pp. 312. 7s. 6d.

The Calendar

Jan.		
26	Royal Society of Arts: "Some Modern Developments in Microscopy." Dr. L. C. Martin. 8 p.m.	John Street, Adelphi, London.
27	Royal Photographic Society. 7 p.m.	35, Russell Square, London
27	Institute of Chemistry and Society of Chemical Industry (Edinburgh Sections). 7.30 p.m.	36, York Place, Edinburgh.
28	British Association of Chemists (Notts and Derby Section), Institute of Chemistry, and Society of Chemical Industry: Dance and Whist Drive. 7.30 p.m.	King's Café, Derby.
29	Society of Dyers and Colourists (West Riding Section): "The Physical Relationships of the Dimensional Characteristics of the Wool Fibre and their Importance in Manufacturing Practice." Dr. S. G. Barker.	Bradford.
30	British Association of Chemists (London Section): Concert. 8 p.m.	Broad Street Station Restaurant, Lond.
30	West Cumberland Society of Chemists and Engineers: "Refractories." J. E. Christopher. 7 p.m.	Workington.
30	Society of Chemical Industry and Institute of Chemistry (Yorkshire Sections): Dinner. 7.30 p.m.	Powolny's Rooms, Bond Street, Leeds.
30	Electroplaters and Depositors' Technical Society. First Annual Dinner.	Lyons' Corner House, Angel, London.
30	Chemical and Allied Industries North East Coast Dinner. 7.30 p.m.	Tilley's Restaurant, Newcastle-on-Tyne

I.C.I. Rubber Service Laboratory

Developments at Blackley

An event of the first importance to the rubber industry took place at Blackley, near Manchester, on Thursday, namely, the official opening of an enlarged and more completely equipped service laboratory for the rubber industry. The services of this laboratory, which has been set up in connection with the organic chemicals and dyestuffs works at Blackley, are at the disposal of any rubber manufacturer on questions relating to the uses of organic chemicals which improve the life, quality, and uses of rubber. Actually the laboratory is a development of the British dyestuffs industry, but although organic dyestuffs and colouring matter are being increasingly used in the production of brightly coloured rubber, the greater part of the work in the laboratory will be advising and assisting manufacturers in the uses of accelerators and anti-oxidants, which represent comparatively recent discoveries.

An " accelerator " reduces the " curing " or vulcanisation time of rubber, thereby lowering production costs, and an " anti-oxidant " or " anti-ager " delays perishing of the rubber, so increasing the life of the article (for example, within the last few years, the length of life of a motor tyre has grown from something like 5,000 to nearly 20,000 miles). These two classes of rubber chemicals are therefore of paramount importance to the trade.

The Rubber Service Laboratory will be an addition to the laboratories at Blackley which deal with the application of dyestuffs and organic chemicals and which already offer service to the textile, leather, paper, and paint industries, etc. The senior staff of the laboratories is composed of university graduates, and in their selection care has been taken to include men with practical experience in the rubber and allied industries, thus ensuring complete understanding of the problems presented for consideration.

Work of the New Laboratory

The work to be carried out in the laboratories can be classified mainly under three headings :—

(1) Rubber service for users of Vulcafor products.—The laboratories will be always prepared to render assistance in the solution of problems which arise in connection with the use of accelerators, anti-agers, colours and other products.

(2) Routine testing of Vulcafor products.—Vulcafor products will be tested by the analytical laboratory to see that they conform with stringent chemical and physical specifications, and then submitted to actual vulcanisation tests in the rubber service laboratories. The company takes pride in the consistent quality of its products, and each delivery of an accelerator or colour is thus checked before despatch. The strength and shade of all colours are tested by compounding and curing under standard conditions. Under this heading of routine testing should be included the constant examination and comparison of competitive products from all over the world; it is in this way that British rubber manufacturers can be assured of a range of products equal to if not better than any available to his foreign competitors.

(3) Research work.—Research work represents one of the most important activities of the rubber service department. This work may be divided into three classes : (*a*) a constant study of organic compounds with a view to developing new and more useful products for use in the rubber trade ; (*b*) research dealing with the properties of various rubber compounds and the development of improved methods of physical and chemical testing ; (*c*) industrial research connected with the development of new or improved manufacturing processes. As a result of this work in the past, a vast number of patents have been taken out throughout the world for new products and processes for use in the rubber industry.

Mixing and Processing

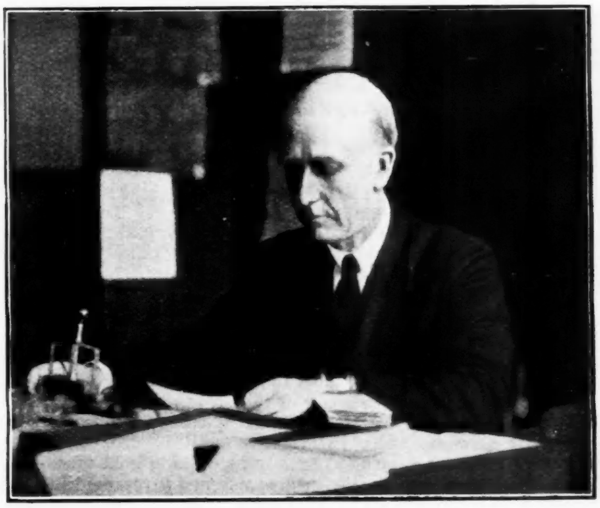
The laboratories contain plant for mixing and processing, including calendering, extruding, spreading, and curing. There are, in addition, physical testing machines of various types, dumb-bell and ring, abrasion testing, and flexing equipment, etc. Accelerated " ageing " is studied by the standard methods such as Geer ovens, oxygen bombs, ozone and ultra-violet light.

Lastly, these rubber service laboratories are not an isolated unit, but will work in close collaboration with the other research laboratories. This means that problems which may arise in connection with the rubber service work, and which require examination in the analytical, optical, or electrical laboratories, can be dealt with by experts in these particular fields. The optical and electrical laboratories are equipped with the latest apparatus and can deal at very short notice with such problems as break-down voltages or resistivity.

The Late Dr. R. B. Moore

We regret to announce the death of Dr. Richard Bishop Moore, well-known for many years as the chief chemist to the Bureau of Mines, Washington, and a distinguished authority on applied chemistry and metallurgy.

Dr. Moore was born in Cincinnati in 1871, and came to England as a child and later studied here. He worked with Sir William Ramsay in London in 1907-8, and was in charge of all the helium work for the United States Bureau of Mines



from 1918 to 1923. During the last few years he has been engaged in American chemical industry. One of his chief interests in life was research work concerning radium and helium.

During a European tour some years ago he called at The Chemical Age office, and, in the course of an interesting chat on conditions in the United States and in this country, he spoke with enthusiasm of the work that was proceeding in the United States in the helium production field. " We hope ultimately," he said, " to be able to produce helium at a cost of 1½d. per cubic foot," and success in this field, he predicted, would have an enormous influence in the development of airships.

Dr. Moore was a familiar figure in this country on account of his periodical visits to Europe. He returned from one of these tours with the party of chemists and chemical engineers that visited Canada and America in 1928, and accompanied them on their tour through Canada and the United States. His death removes a very valuable member of the American chemical industry.

Attorney-General v. Chemical Engineering Co., Ltd.

To the Editor of the Chemical Age

Sir,—With reference to the petition brought against this company as above, we have pleasure in informing you that this was in reference to Income Tax only, and non-payment was due to an oversight on the part of our secretarial department. We also have the pleasure to inform you that, as soon as the mistake was discovered, the full amount of the Income Tax was immediately remitted, and at the hearing today the petition was dismissed unopposed.—Yours, etc.,

The Chemical Engineering and Wilton's Patent Furnace Co., Ltd.

January 19, 1931.

A Survey of Modern Grinding Machinery

By J. C. Farrant

A paper entitled "Modern Grinding" and containing an account of the development and fields of application of the various classes of grinding machinery now on the market was read by Mr. Farrant at a meeting of the Chemical Engineering Group of the Society of Chemical Industry at the Friary Hotel, Derby, on Friday evening.

In many industries grinding or pulverising forms the major part of the total cost of the final product. The object of this paper is to set out actual operating data on different materials to indicate the fields in which different classes of mills can be most efficiently applied.

The selection of the right type of grinding machinery is often a matter of some difficulty in view of the scores of different makes on the market. To discuss the respective merits of such a large number of machines is out of the question, and it is proposed, therefore, to divide them into three main groups, with examples of the work done by each group. A brief reference is made to the simplest form of grinding practised centuries ago, and it is clear that the principles underlying the earliest mills are still in vogue in many modern mills, greater efficiency having been obtained by improvement in general design.

One of the earliest forms of commercial grinding is illustrated by the "Arrastra" mill, which consisted of a stone-lined chamber with vertical pole and cross-bar, from which were suspended large blocks of stone. The material to be ground was charged into the stone chamber, and the central spindle revolved by manual or animal labour. This system is identical to that used in some trades to-day, except that the grinding stones are mechanically revolved. The system is capable of producing a very fine product, but the disadvantages are low output per unit of power and high labour costs. The development of this type is faithfully represented in the Chile mill, or edge-runner.

From this source other types were developed which differed considerably in design, the most important being the Huntingdon mill, in which the pressure of the grinding rolls is exerted horizontally instead of vertically as in the case of the pan and edge-runners. The Huntingdon mill is used for wet grinding, and was developed largely for milling gold ores. It is an excellent amalgamator, as the mercury is retained in the well at the bottom away from the grinding members, consequently there is little loss of amalgam. The maintenance on this mill is high, and the rapid wear on the grinding members when dealing with hard silicious materials results in a steady decrease in output, but the following important fact was established—that while the grinding elements remained sound and of good shape, the unit power consumption per ton was relatively low. This accounted for the rapid development of this principle for dry grinding materials and minerals of moderate hardness, as represented by such well-known mills as the Raymond, Sturtevant, Griffin, Bradley, Maxecon mills, and the Fuller mill, which only differs from the others in that it uses balls instead of rolls, and the later developments such as the Rome and Lopulco mills.

Three Groups of Mills

The foregoing relates to one class of mill, which we will call for convenience sake medium speed mills, in which centrifugal force, or spring pressure, effects rupture by compression.

We now turn to another group—the high-speed mills. The elementary design of these machines is simple and inexpensive, and is reflected in the hundreds of different makes on the market, Raymond, Resolutor, and Miracle being three representative types. These hammer or beater mills consist of a shaft to which are attached various sizes and shapes of grinding media, the whole enclosed in a metal-lined chamber in which there is a feed inlet and outlet for ground material. The incoming material is shattered by a direct blow of the beaters, and also by the impact of the material being hurled against the lining of the chamber, and by a direct shearing action. Variations of this type will be found in those mills which depend largely upon a shearing effect obtained by having one set of bars, or pins, stationary, and the other revolving at high speed. Both members may be rotating at different speeds, or in opposite directions, as in the Harrison Carter, Kek, and Attritor mills.

The next group (slow speed) is quite distinct, and is the tube mill. Subsequent developments are the ball and rod mills.

From the foregoing, mills of all descriptions may be classified into three main groups, high speed, medium speed, and low speed. Diminution is effected by compression, shattering and attrition. One or more of these forces is to be found in mills in either group, but the predominating factors may be classified as follows:—High speed, impact and shearing; medium speed, compression; low speed, attrition and impact. Shearing occurs in all types, but to a much greater extent in high speed mills.

It is impossible to prepare a list of materials which are best suited to each type of mill, because there are so many factors which enter into the final selection quite apart from the grindability factor of the material. An example is given here of three different materials, each of which can be handled to the greatest advantage by the type of mill indicated:—Group I, slow speed—silica; Group II, medium speed—phosphates; Group III, high speed—precipitated colours and light chemicals.

Nature of Materials

Characteristics of different materials have to be carefully considered in connection with the selection of the right grinding equipment. The most common reference to any material is that it is either hard, abrasive, or soft, and the common assumption is that the harder the material, the greater the power consumption per ton. This is erroneous; toughness is the chief factor in power consumption. The characteristics of minerals that have to be considered in the selection of grinding equipment may be classified as follows:—Hard, tough, friable, sticky, soapy, hygroscopic, specific gravity.

Hard minerals may generally be classified as being above "5" in the scale of hardness; examples:—carborundum, coke, quartz, felspar, and various silicious minerals. Tough and hard—basalt, grey slate, trap rock, corundum. Tough and soft—ebonite, hoofs and horns, fibrous materials. Soapy—talc, graphite. Sticky—certain oxides, certain phosphates, natural asphalt, bitumastic products, gums, resin, chalk, glue and titanium oxide. Friable—various salts, chemical compounds, and steamed bones.

Other points that have to be taken into consideration are: Climatic conditions, effect of temperature generated in mill, contamination of finished product, and hygroscopic material.

The particular formation of the mineral to be ground may have considerable effect on output—*e.g.*, various carbons, charcoal, coal, anthracite, flaked and amorphous graphite. They all belong to the carbon family, yet no two of them are alike in their grindability. The following refers to a few well-known types of mills in each group which are applied to various industrial problems, and indicates the application of these mills in conjunction with the different characteristics of materials.

Group I—slow speed.—Pan mills, burrstone, Stag ball mill, Hardinge ball and pebble mills, cylindrical ball and pebble mills, rod mills.

Group II—medium speed.—Roller mills, such as Fuller, Raymond, Sturtevant, Bradley, Griffin, Rema, and Lopulco.

Group III—high speed.—Impax, Resolutor, Attritor, Kek, Miracle, Carter, Christy and Norris disintegrators, Simon Carves.

Tough materials depend upon the degree of hardness. A hard dense grey slate will go under Group I, and friable green slate under Group II. Toughness alone, without hardness, is unsuitable for Group I, with the interesting and peculiar exception of the grinding of pure lead balls, which forms a good example of attrition grinding. Neither Group II or III are suitable for this purpose as the lead would be flattened.

Discharge of Product

Having dealt with certain conditions, we will now examine the lines upon which increased efficiency in grinding equipment has been effected. A previous reference was made to the importance of the elimination from the grinding mill of all that material which is already fine enough, and an excellent illustration is afforded in the design of the Krupp ball mill for obtaining this end. The introduction of this mill was followed

by a very wide demand, and marked a definite step in the progress of mill design, because means were provided for the automatic removal of fine material as soon as it was produced, with a consequent saving in power. The scope of this mill is limited, however, to fields which require a moderately fine product, as the screen around the periphery of the mill is the limiting factor as regards output and fineness, the degree of moisture in the initial feed having a distinct effect on both.

Inasmuch as the screen integral with this particular type of mill was the limiting factor, development of this principle found expression in separate classifying units, the discharge from the mill being conveyed usually by elevator to the separator, and the tailings returned by gravity or by conveyor. This arrangement has the advantage of a more adequate screening surface, greater capacity, less time taken to effect repairs, greater flexibility of plant operation, and can be employed with many of the different types of grinding units. Here again there is a limit to which screens can be employed for certain classes of material, output being effected by moisture and fineness of product required.

With the advance in air classification, this limiting factor has been overcome. This may be found in those medium-speed mills which employ screens through which air is drawn, enabling a large capacity to be handled per square foot of screen area. Also the whole of the screen area is utilised in contra-distinction to the Krupp type of mill on which a relatively small area is used at any given time.

The advantages of the present-day practice in which air is the main factor for controlling the finished product when incorporated in the mill are : The elimination of moving parts, such as elevators and conveyors ; the elimination of dust ; and saving in floor space, all of which are important factors.

Wet Grinding

By comparison with dry grinding the types of mills for wet grinding are comparatively few, and are represented by pan mills, edge-runners, burrstones, tube mills, cylindrical ball mills, conical ball mills. Stamp mills of various designs are now used to a very limited extent.

In 1907 a mill was invented which had a revolutionary effect on milling. This was the conical mill invented by H. W. Hardinge, who subsequently received the John Scott medal, an award granted for the outstanding achievement of the year in the metallurgical field. The essence of the invention was the conical shape which caused the grinding media, which were of different sizes, to arrange themselves in the mill according to their diameters. To some extent the ore followed this principle, in that large pieces would remain in the cylindrical portion until broken down. The product discharged from the conical mill was more evenly graded and higher recoveries of metals followed.

The next advance was the substitution of flint pebbles by metallic balls as grinding media, and particularly for reducing ore if coarser than ½ in. size. As the ball mill became established, so followed the gradual elimination of the stamp mill. Then followed the close-circuiting of mills with classifiers, starting with the simple cone, and followed by various mechanically-operated types, of which the best known is the Dorr classifier.

Since the advent of the conical mill, short cylindrical ball mills have been developed for ore reduction. One of the best known is the Marcy—this employs grates at the discharge through which the pulp is delivered. Many installations of this type have been made.

The rod mill was next developed, but its application is distinctly limited compared with a ball mill. It is essentially a granulator, and not a fine grinder, it takes less power than a ball mill in grinding to a given size, because it produces less fines, and consequently less work is done, but for certain problems of ore reduction a better recovery can be made from a rod mill product than that of a ball mill. Rod mills are extensively used in the wood-pulp industry, and in those circumstances where a granular product is required. Rod mills will also dry grind minerals with a higher percentage of moisture than a ball mill, *i.e.*, when hot air cannot be used.

A new development in classification is the Andrews classifier It is based on an entirely new principle so far as classification is concerned, *i.e.*, the use of high velocity for effecting separation, and automatic washing of the sands to be returned for regrinding. An important feature of this plant is the small floor space required and the high efficiency of separation. An interesting off-shoot of this principle is found in the kinetic elutriator for ascertaining the grading analysis of ground materials too fine for screening. The work of a Schoen elutriator, which requires 12 to 24 hours, is run through by the Andrews elutriator in 1 to 1½ hours. This saving in time is largely effected by the special construction which enables the fine particles to rise and overflow without having to pass through a dense, eddying mass of coarse and intermediate particles. These coarse and intermediate particles can thus circulate more freely, and the bombardment produced effectively breaks up any aggregations. The fines thus liberated at once rise and join the overflow, and are removed from the system.

Pulverised Fuel

The use of powdered coal for steam raising, kiln firing, and metallurgical furnace heating has developed rapidly during the past few years, and a great amount of information has been gleaned and published in connection with the milling of various coals, and their suitability as fuels for the many different applications which arise. It is probably more difficult to indicate the best type of mill for any given problem in this than in any other field, as whilst there are considerable variations in the grindability of different coals, coal considered from a grinding standpoint is not really a hard substance. Consequently local conditions play a larger part in the selection of the equipment than in ordinary industrial problems. In addition, the fact that this is a comparatively new industry leads to changes of fashions and opinions.

There are two systems of powdered coal preparation. First, the central storage, and secondly, the direct transport of coal from the mill to the burner. The latter is generally referred to as the unit system. In the first mentioned, as its name implies, the coal is pulverised in one or more mills, and is then collected in a main storage hopper, whence it is drawn off and blown, or conveyed, to the burners as and when required. In the unit system the coal is blown direct to one or more burners by the fan which draws it from the mill.

The central system is most suitable for use with constant output mills, as the latter can be run at maximum duty for a certain number of hours per day, leaving the remainder of the time for renewals and repairs. In this way little or no standby milling equipment is required. In this system the coal is drawn from the mill by a fan and is collected in a cyclone separator and deposited in the storage bunker, the air then returning to the mill to be recirculated. The unit system offers a simpler plant as the mill is connected through a fan direct to the burner.

In plants designed to run for 24 hours per day, it is imperative, however, to instal standby machines, so that these may be brought into use when it is desired to overhaul or renew any part of the other mills. Another factor in its favour is, of course, that it is a cheaper plant in first cost, although maintenance figures (especially where the loads vary) are usually higher than in the central system. Mills in Groups I and II are definitely indicated for the central system. For the unit system all three groups are used, but mills in Group III are popular on account of the small floor space occupied and simplicity.

Until comparatively recently these unit installations were not of a large denomination in total output, but there is no doubt that the tendency at the present time is toward unit milling as distinct from central milling, even for large plants, as will be noted from the following list, each having a grinding capacity in excess of 70 tons per hour, two of which are of the unit system.

	Mill	Group	System
Imperial Chemical Industries, Ltd., Billingham	Hardinge	I	Central
Vitry Power Station, France ..	,,	I	,,
Hams Hall Power Station, Birmingham	Attritor	III	Unit
Barking Power Station, London	Raymond	II	Central
Klingenberg, Berlin	Lopulco	II	,,
Lake Shore, Cleveland, Ohio ..	Raymond	II	,,
Massilon, Massilon, U.S. ..	Impact	III	Unit
Trenton Channel, Trenton, Mich.	Raymond	II	Central
Colfax, Pittsburgh, Pa.	,,	II	,,
Fordson, Fordson, Mich. ..	,,	II	,,
Toronto, Toronto, Ohio	,,	II	,,
Cahokia, St. Louis, Ill.	,,	II	,,

Cement Grinding

Cement grinding is a field in which a large amount of experiment has taken place and full-scale trials on a number of different materials have been carried out at different periods. The finishing mills are almost invariably tube mills or compound mills, but in those cases where two-stage grinding is carried out mills of different types are used for primary grinding. The one-stage large compound mill is accepted as standard practice by many companies and in different countries.

It may be definitely stated that air separation for the final product is not considered favourably by the cement trade in general, although there are many cases where independent separators are used in close circuit with finishing mills, particularly in America.

Sulphur Grinding

Special reference is made to the fine grinding of sulphur as improvements in design have been effected in co-operation with producers which have not only materially reduced the risk of fire, but have enabled milling operations to be carried out on a larger scale. The information submitted has been gathered from one particular type of mill, the Raymond roller mill. It is not, however, submitted that this is the only mill from which such results can be obtained.

In a number of installations high-speed pulverisers have formerly been used for comparatively small capacities, in which the risk of fire and explosion has been found to be relatively small. It was found absolutely necessary to use a neutral gas. The usual procedure is to make CO_2 gas by burning either oil or coke in a furnace. This is either air-cooled in a long pipe or water-cooled. The gas is introduced into the mill by positive pressure. CO_2 recorders are used to determine the percentage of CO_2 gas in the supply line to the mill, as well as the concentration in the milling system. Concentration should be kept at not less than 8 per cent. CO_2 at all times. It is reported that explosions do not occur if this concentration is maintained. Precautionary measures are being taken by placing the mill in a fireproof building.

Equipment as such is only one factor in the final cost of grinding per ton. There is a great deal of waste effort in other directions, one in particular is the lack of uniformity in specifying the grading of the finished products. Not only is the permissible residue on a given mesh frequently extremely vague, but in half-a-dozen industries there might be half-a-dozen different methods of measurement. The layout of a plant causing, as it does frequently, double handling, and the admission of dust in dry grinding plants, is not conducive to low running costs.

The disinclination of many operators to carry necessary spare parts is the most expensive form of economy. The replacement of a spare part from stock not only saves time in the actual replacement, but what is far more important, the replacement at the right time may save a serious replacement, or even a breakdown. It is this last factor which has the greatest effect on production costs. Systematic inspection of working parts at regular intervals is the cheapest form of insuring maximum output. The periods of time naturally depend upon the type of machine, and also upon the class of material being ground.

Another important factor is the co-operation between the manufacturer and the producer. The more information that can be passed between the two parties relative to the particular problem, the greater the chance of cutting down production costs.

"C.A." Queries

We receive so many inquiries from readers as to technical, industrial, and other points, that we have decided to make a selection for publication. In cases where the answers are of general interest, they will be published; in others, the answers will simply be passed on to the inquirers. Readers are invited to supply information on the subjects of the queries :—

160. (*Calcium Hypochlorite*).—A subscriber is anxious to be put in touch with manufacturers of Calcium Hypochlorite, and also of Ethylene Oxide. The latter, it is understood, can be used as a fumigator.

161. (*Ahrents' Automatic Tap.*) A subscriber wishes to obtain particulars of Ahrents' Automatic Tap, which, it is understood, is used in connection with lead and tin blast furnaces.

High Pressure Researches

Hurter Memorial Lecture by Professor Morgan

"Organic Synthesis Facilitated by Pressure," was the title of the Hurter Memorial Lecture, delivered before the Liverpool Section of the Society of Chemical Industry on Friday, January 16, by Professor G. T. Morgan, Director of the Chemical Research Laboratory, Teddington. Dr. William Trantom occupied the chair and a representative attendance included the Lord Mayor of Liverpool (Mr. Edwin Thompson), who is a member of the section, and Sir Max Muspratt.

Professor Morgan explained that the discovery of synthetic dyes created a demand for large quantities of coal tar intermediates obtainable only by reactions carried out under pressure. These requirements led to the construction of large autoclaves such as are still employed in the manufacture of dimethyl aniline and other aromatic bases. Since the beginning of the present century considerable advances had been made in the employment of pressure to facilitate the hydrogenation of the oxides of carbon in presence of catalysts. In experiments carried out at the Chemical Research Laboratory, Teddington, notable quantities of ethyl alcohol had been produced.

Discussing the trend of high pressure researches Professor Morgan said that the reduction of pressure was of obvious technical advantage and was an end to be kept in view in all high pressure research. The lowering of the temperature was also of far-reaching importance, for it rendered possible the synthesis of organic compounds which were decomposed by heat. For instance, by the hydrogenation of the oxides of carbon in presence of catalysts one obtained comparatively simple organic compounds which also arose through the agency of living organisms, and it seemed likely that if such high pressure synthesis could be effected at ordinary temperature even more complex analogues of the products of vital activity would be obtainable.

The lecture was illustrated by specimens of high pressure plant, and by many samples of the chemical products obtained under these conditions.

Soap and Candle Industry Census

Returns for the Irish Free State

Particulars are now available as the result of the census of operations during 1929 of the eight establishments in which soap and candles were made in the Irish Free State. The returns indicate, states the *Board of Trade Journal*, that all the establishments were working continuously during the year; five were engaged full time throughout, but some of the workers of three establishments were placed on short time during certain periods of the year. The normal number of hours worked by wage-earners in the majority of factories was 47 or 48 per week—the hours in one factory were more than 48, and in two factories less than 47.

The total selling value of the products made in 1929, for sale, by the eight establishments was £517,504, as against £391,675 in 1926. This amount included hard soap, household and laundry in bars and tablets, £242,595, and candles £186,042. There was a considerable increase in the quantity and value of soap manufactures in 1929 as compared with 1926—the value increasing from £170,588 in 1926 to £314,560 in 1929, or 84 per cent. There was an increase in the quantity of candles manufactured in 1929 as compared with 1926, though their selling value showed a decrease of £10,921. The value of soap manufactures imported into the Free State declined from £341,640 in 1926 to £123,918 in 1929, or 64 per cent.

The total cost of the principal materials used in the soap and candle industry in 1929 was £365,348, as compared with £275,540 in 1926. This total included cost of materials, £309,450, and purchase of cases, boxes, etc., £47,428. The net output of the industry was, therefore, £152,156, as compared with £116,135 in 1926.

The total number of persons employed in the soap and candle industry during the week ended October 19, 1929, was 591; the corresponding figure in 1926 being 422. Of this total, 385 were males and 206 females. The amounts paid in salaries, wages and earnings during the years 1929 and 1926 were £68,475 and £56,607 respectively. Of this amount £24,908 represented salaries, and wages and earnings, £43,567.

New Canadian Fertiliser Plant

Its Construction and Capabilities

THE first unit of the new fertiliser plant of the Consolidated Mining and Smelting Co. of Canada, Ltd., at Trail, British Columbia, is expected to be in partial operation next spring, at least so far as the superphosphate plant is concerned. It will, however, be some time before the other fertiliser products, such as ammonium sulphate and ammonium phosphate are manufactured.

The whole layout consists of a group of administrative buildings and workshops on a 137-acre site known as the Warfield Flat at Tadanac, overlooking the great metallurgical industries at Trail. The administrative buildings include a soil research laboratory already engaged in important studies of the soils of the Prairie Provinces and elsewhere, in order to determine their precise requirements in the matter of fertiliser. There is also an assay office. In the manufacturing section of the new plant there are: A hydrogen plant at the outer end of which is the mercury arc rectifier installation; a central plant called the " nitrogen plant " ; and the ammonia plant.

Projected Ammonium Sulphate Plant

Next spring an ammonium sulphate plant capable of producing 150 tons daily will be built. Between the hydrogen and nitrogen plants there will be erected three huge cylindrical gas containers 55 ft., 60 ft., and 90 ft. in diameter, the largest of which will receive and store under pressure gas from the hydrogen plant. The smallest will store nitrogen and the one of medium capacity will hold a mixture of these two gases from which the ammonia will be made. The hydrogen plant will produce hydrogen by the electrolysis of water, while in the nitrogen plant air will be liquefied, separating the nitrogen from the oxygen. In the ammonia plant the mixture of gases consisting of one part of nitrogen to three of hydrogen will be compressed under 4,500 lb. pressure and passed through a heated catalyst, resulting in the production of anhydrous ammonia. Until the ammonium sulphate plant is ready to carry the manufacturing process still further, the ammonia plant will not be brought into operation.

The hydrogen plant measures 285 ft. in length by 125 ft. in width, its principal feature being the mercury arc rectifier plant converting alternating electrical current into the direct current needed for the hydrolysis of water. This section of the plant is the largest installation of its kind on the continent, exceeding by 20 per cent. the previous largest erected last year by the Consolidated Mining and Smelting Company at Tadanac in connection with its zinc fuming plant. In the new nitrogen plant there will be housed the installation necessary to produce nitrogen from the atmosphere by the Claude liquid air process. This building will be about 185 ft. by 152 ft. when completed.

Superphosphate Manufacture

In another section of the manufacturing area are situated the operations connected with phosphate, the first of which is the large phosphoric acid plant in which superphosphate fertiliser will be produced by the application of sulphuric acid to phosphate rock brought from Fernie or Crow's Nest in British Columbia, or from other sources of supply. The plant is designed to turn out 300 tons of triple superphosphate per day, and will utilise in the treatment of phosphate rock the sulphuric acid produced from smelter gases at the Tadanac metallurgical works. The phosphate plant will be 334 ft. long by 116 ft. wide, part of the plant being 90 ft. high and the rest 50 ft., with concrete foundations, there being used in its construction no less than 192 concrete columns and 1,050 tons of structural steel.

Belt conveyors will take the superphosphate to a huge storage structure 460 ft. in length, 105 ft. in width, and 40 ft. in height. Rapid progress is being made in the construction of this building, for which an immense amount of excavation work was found necessary, 55,000 cubic yards of earth being removed for the bins extending 25 ft. below ground level. This huge storage accommodation is required in view of the fact that the distribution of fertiliser will be mainly carried on during the spring months, thus necessitating nine months' storage. A travelling crane with clamshell bucket will scoop up the stored fertiliser when required, drop it into the hoppers of the discharging mills, of which there will be six to sack the product prior to despatch.

The chemical fertiliser plant will utilise between 35,000 and 40,000 h.p. of electrical energy when it reaches its first-unit stage, most of the power going to the mercury arc rectifier installation.

Economy in Heat Production

The process heat as well as heat for warming the buildings in winter will be piped from the new zinc fuming plant of the Tadanac smelter, where waste or by-product heat is available for use in central heating at Tadanac and Warfield, and even for institutions in the city of Trail. The principal connection with the Tadanac smelter, however, is the sulphuric acid pipe line. Utilisation of the large quantities of sulphuric acid manufactured as a by-product by the contact process from the smelter gases was the main consideration leading to the establishment of the fertiliser industry. This branch of the fertiliser plant is therefore situated at the smelter, where a sulphuric acid plant with a daily capacity of 35 tons has been producing during the past year.

There is, however, now under construction the first of three additional units of 112 tons each, which will give a combined capacity of 336 tons of acid per day for use in fertiliser manufacture. The first unit will be producing acid before the end of the year, and will go into operation as soon as the phosphate plant is ready to manufacture fertiliser next spring. The entire sulphuric acid plant is expected to be ready for operation next summer. Connection with the fertiliser plant will be by a surface pipe line 6,000 ft. long and 4 in. in diameter. Some 400 to 450 men are employed on the erection of the fertiliser plant itself, but the construction programme as a whole is employing between 700 and 800 men.

Chemistry and Industrial Recovery

American Chemist's Prediction

THE chemical industries, " still in their first youth, with their great development still before them," will lead the advance to prosperity, Dr. Arthur D. Little, of Cambridge, Mass., declared in an address at a joint meeting of the chemical societies in Columbia University, on the occasion of his receiving the Perkin Medal, awarded annually to " the American chemist who has most distinguished himself by his services to applied chemistry."

" Since advances in chemistry react on every industry, while, conversely, every progressive trend in other industries makes new demands on chemistry, we may look with confidence," Dr. Little said, " to the chemical industries for contributions which should go far toward supplying the stimulus essential to the revival of our prosperity, and which the stationary or obsolescent industries can no longer furnish. We may expect, for instance, a phenomenal development in the plastics industry, and in materials of construction adapted to the mass production of dwelling-houses. New chemical agents are beginning to replace water in heating and power equipment, new products from water gas and from the waste gases of oil refineries are in sight, and even new foods are in prospect. Meanwhile sulphuric acid, chlorine, and soda remain as much basic commodities as steel.

Introduction of New Products

" Prominent among the factors contributing to the exceptional prosperity which our country, until recently, enjoyed was the development of certain new industries, which furnished employment to millions of men and to hundreds of millions of dollars. Some of these, like the automobile industry, have probably passed the peak of their demand for men and money alike. Industries age like human beings. The railroads are old, the automobile is approaching middle age, but our chemical industries are still in their energetic and elastic youth, with their great development still before them. They have had the vitality to withstand the present depression better than most others. While steel production has shrunk to forty per cent. of capacity, the chemical industries have brought out cellophane, new plastics, synthetic ammonia, and methanol, and many other products to compensate for shrinkage in other lines. They have developed new catalysts, high-pressure processes and equipment, and have gone to new extremes of temperature both up and down the scale. Chemistry is a creative science, and the first chapter of its Book of Genesis is not yet written."

Natural and Artificial Gums

By Dr. W. Nagel

The relative merits of natural and artificial gums and the extent to which the synthetic may be able to replace the natural product are considered in the following article, which is abstracted from a contribution by Dr. Nagel to two recent issues of "Die Metallbörse."

In general, when synthetic products which can replace natural products of the same kind are first produced, it is only at a cost which considerably exceeds the price of the natural product, assuming the two products to be about equal in quality. In the field of artificial gum production, however, there is one kind of artificial product which from the beginning was competitive with the natural gums. This is the phenolformaldehyde gum produced from commercial phenol and commercial formaldehyde which are comparatively cheap and manufactured by a simple and therefore cheap process. Moreover, the quality of the artificial product in many cases is superior to that of the natural gums.

One advantage possessed by the artificial product is greater hardness; and other useful properties are solubility in alcohol, and by careful heating it melts to a clear liquid. By heating up to 140° C. the gum loses these properties of solubility and melting and passes into a clear horn-like mass no longer affected by alcohol. By further increasing the temperature the gum becomes carbonised but does not melt; the temperature necessary for this carbonising is about 300° C., which is approximately that at which most organic compounds become decomposed. With the discovery of the property of hardness and the more important knowledge of controlling this property, the artificial gum was found generally preferable to the natural gums and moreover, found a number of fields for employment not previously served by gum. Even the higher grade natural gums have a smaller temperature stability then the phenol-formaldehyde product with perhaps exceptions in the case of unmelted amber and a few copal gums.

Comparison of Merits

Not only have these hard artificial gums largely displaced the natural gums, but also metals, stone, wood, etc., because of their relatively small specific gravity, their mechanical strength and chemical stability, their hardness, and some other desirable properties, so that objects of large dimensions are now manufactured out of the artificial products. Against these advantages natural gums possess merits in being cheaper, greater knowledge as to their application, and in the conservatism of many users which makes them adhere to the use of material to which they have long been accustomed. The advantage of cheapness is probably only temporary, because the artificial gums will gradually be manufactured in increasing quantity from the widespread raw material available and thus become cheaper, and the working of the artificial products will probably become no more difficult than the working of natural gums.

The property of good hardness of the phenol-formaldehyde gums is found also in some natural gums. For example, shellac and the closely related Australian acaroid gums may be mentioned. Normal shellac melts at about 70° C., to a viscous clotted mass which is soluble in alcohol (except shellac wax); if heated at temperatures of 190–210° C., or at a longer time at a lower temperature, it does not melt to a rather mobile liquid like the artificial gum, but tends to thicken and, according to the heat treatment, it passes into a very tough horn-like mass. If heated too quickly, bubbles are generated in the melt due perhaps to traces of water or to some decomposition.

In practice also the shellac shows the disadvantage against the artificial product of being less suited for high and very high tension purposes in electrical technique.

Not all the constituents in shellac take part in hardening; the shellac is not a simple substance but contains wax, colouring and odoriferous matter, and to about 20 per cent. consists of a yellowy cream-like mixture of fusible, but not polymerising, oxy-acids, the disadvantages of which are obvious. While four-fifths of the gum remains hard, the other fifth melts and permeates the hard product, and with a higher temperature evaporates with partial decomposition and reaction. Thus, notwithstanding that shellac hardens, it becomes sticky at about 220° C., and softens, and if held at this temperature for some time, a semi-liquid separates from it. On the other hand, the phenol-formaldehyde gums remain firm up to 300° C., and only then begin gradually to carbonise.

Electro-Technique

The balance of advantage in use would thus seem to lie on the side of the artificial product, if the question had not again become complicated by a recent observation. In electro-technique paper strips treated with an alcohol solution of shellac or artificial gum are compressed together in the presence of heat by which the alcohol is vaporised, leaving a soft coating of gum on the surface of the paper. These highly compressed coated strips form when cool a very hard body usually in the form of rolls and platens which can be worked in almost any desired way. They can be drilled, turned, ground, polished, etc., and formed into the many required shapes and profiles required for different purposes in the electrical industry.

If on normal good hardened shellac or phenol-formaldehyde gum-hardened paper platens two strips of brass are stretched, one strip being positively and the other negatively electrically charged, sparking will occur as soon as the electrical tension exceeds a certain point, and this sparking naturally will act destructively on the platens and leave a number of burnt spots. If the tension is increased carefully to increase the sparking and the damage to the platens, there is found to be a gradual lowering of the difference in potential in the artificial gum-coated paper, while, except for small errors of observation, there is no such difference in the potential in the platen made up of shellac-coated paper. It is believed that the explanation of this is that the decomposition products of the artificial gum are conducting, while the corresponding products of the shellac are indifferent to the electric current. If this conclusion becomes firmly established it seems likely to favour the use of the natural gum against the artificial gum in the electrical industry, because in relation to the importance of the above-named circumstance, the other advantages of the artificial gum are of small account.

The superiority in hardness of the artificial gums has naturally led those interested in natural gums to investigate the possibilities of improving the natural products. One method used is the esterising or salt-forming of the constituents in natural gums with low melting points. This has succeeded so far that natural gums have recovered some of the ground lost to the artificial gums by the possibilities created by the use of colophonium and cheap copals.

Hardness of Shellac

The hardness of shellac was first systematically studied through the competition of the artificial gums; formerly the principal requirements in a substitute for shellac were limited to chemical stability, solubility in alcohol, and the formation of a dry hard and fairly elastic film. Corresponding to the then few sharply defined conditions, products made and marketed during the War were of very indifferent quality and had little claim to be regarded as shellac substitutes. In later years the quality of these substitute materials has been improved, but all possess the disadvantage of being much more brittle than shellac—a circumstance of great practical importance. Some are so brittle that their employment in cases where the gum coating is subject to blows, pressure, or friction is very limited. The addition of softening materials to reduce brittleness introduces other disadvantages, and particularly that of lowering the hardness. Shellac itself is not highly elastic, although greatly superior in this respect to its substitutes.

The investigation of this matter of brittleness was the subject of some experimental work carried out in the Siemens laboratories. The results obtained in this investigation led to the following conclusions: (1) Shellac possesses considerably greater capacity than artificial substitutes to retain liquid in the film formed by evaporating the solvent which guarantees a certain amount of elasticity in the film; (2) in contrast to all substitute products shellac becomes more elastic by warming without becoming pasty. This fact is readily demonstrated by taking a little of the dissolved material between the fingers and allowing the alcohol to evaporate by the heat

of the hand. The substitutes will become pasty without any appreciable increase in the elasticity and on cooling the film will be brittle like extremely thin glass. A shellac film obobtained in the same way will become dry and hard, but at the same time can be bent like paper with only a slight tendency to spring back into the original position.

In Oil Lacquers

Passing from gums of the above kinds to the oil lacquers, it is found that the artificial products have already an important field of employment and are slowly but surely replacing the natural gums. It is generally known that, in order to form an oil lacquer, a suitable gum must be heated with linseed or other drying oil. The gum goes into solution and forms after the drying of the painted surface a hard clear film. Hitherto, the preference has been given to copal gums, but without pre-treatment these are not soluble in oil. The preparation of these natural gums consists of heating them to the melting point during which carbon dioxide is given off and considerable scum forms on the surface of the molten gum which is removed. In this way a clear colophonium is obtained which is soluble in hot oil. The melting process has already been much discussed in the literature on gums; to obtain the desired results much experience and care are required.

Even with this treatment, the disadvantage remains that out of the clear, hard and fairly tough copal, there is formed also a dark coloured, very brittle product which, however, is soluble in oil. An important step in the artificial gum industry was the discovery of an artificial product of approximately the same properties as copal requiring no previous melting before use which would dissolve in hot oil. This was obtained by the use of the phenol-formaldehyde condensation mixed with natural gum. As end product of the reaction there was obtained, not merely a mixture or solid solution of the two constituents, but a chemically new product with the desired properties through a simple operation, not separable by distillation, extraction, or by mechanical means. According to the kind and quantity of the raw materials and selection of the reaction conditions, the products can be varied. This process can be regarded either as progress in artificial gum production or as the improvement of natural gums, and both standpoints are justified.

Condition and Composition of Gums

The conception of gum relates to a property perhaps better described as a condition. The theory of artificial gum production rests on this conception; artificial gums have been sought in many different classes of organic compounds, even in those in which the members are distinctly crystalline. In such cases it has been sought to prevent crystal forming by additions of small quantities of inhibiting material. Many kinds of American colphonium which show an inclination to crystallise are subjected to the action of ultra-violet rays which appear to produce a chemical change; it is to be expected that a similar result can be obtained by direct mixing of suitable substances.

Although it has been established that gum is a characteristic of condition and not composition, it must be emphasised that this condition is strongly dependent on the composition. The size and the arrangement of the molecules and, above all, of the unsaturated compounds are of great importance. It is not general to take substances with small molecules and ascertained good crystallisation capacity and to seek by mixtures to produce gum forming conditions, but to take substances which are known to form very large molecules through polymerisation or condensation and with little tendency to crystallise, which can be learnt from their formulæ.

Almost by pure instinct, investigators in the field of artificial gums appear to have worked on this basis from the beginning; the first artificial gum manufactured was the cumaron gum in which the tendency to polymerise of the cumarons and similarly constituted bodies in coal tar were utilised. The phenol-formaldehyde gum, which in the first place was difficult to produce because of the complication of oxy-acids obtained by the great reactivity of formaldehyde, was finally obtained through the experimental mixing of substances which produced the gum condition, and hardening properties through the introduction of further reactions. Lactic acid gum was obtained by suppressing the small developed tendency of lactic acid to crystallise, splitting off water from the molecules, and the recombination of these molecules by condensation into great molecule complexes; the gyptales were obtained by a combination of different acids and alcohols in a similar way, and other examples could be given.

Formation of Natural Gums

It is interesting to speculate as to how Nature works in the formation of natural gums. She appears to work in much the same way as in the method used in the manufacture of artificial gums, but without the class of compound at her disposal. Phenols and aldehydes are not available in nature because they do not exist in sufficient quantity and are never found together. However, the polymerising of the terpenes and sesqui-terpenes, the small tendency to crystallise, and their great chemical convertibility, have been used by Nature to produce the range of natural gums. It happens, therefore, that natural gums are structurally of a rather uniform stamp; most of them are related to the terpenes, but that they need not be so derived is shown, for example, by shellac, which is seldom formed according to the gum-forming principle. Through the splitting-off of water of certain oxy-acids that only to a small extent originate from the terpene series, and their polymerisation or condensation, the molecule becomes so large as to have colloid dimensions. In artificial gums this formation principle finds its analogue in the lactic acid gums, but in Nature it tends to form sugar and polysaccharides and, as already mentioned, only gums in the cases of shellac and acaroids. It is shown also that a uniform building scheme for gums does not exist in Nature.

Ripening of Gums

One process which is common both to natural gum and artificial gum is the ripening. The natural gum exudes from injured tree-bark, or drops in semi-liquid form from leaves, or is a syrupy excretion of insects. However, it soon hardens to a glass-like substance and becomes coated with a fine honeycomb-structured weathered crust; after it has been formed for many years it becomes insoluble and unmeltable. If the geological period has been long enough it has become formed into horn-like resistant masses which cannot be changed chemically or physically without destroying them. From the colophonium gums of the earlier conifers amber originated, and also the goose-skin copal of Zanzibar and many other fossil gums.

In artificial gums, the mechanical and chemical analogous running processes, the hardening, the passage into insoluble and unmeltable stages of the phenol-formaldehyde gums, of glyptales, and urea condensation products are similar. The end products in both cases are both highly physically and chemically resistant substances. Unfortunately, so far as the constitution of both hardened artificial and natural gums is concerned, there is not very much known, so that a comparison in this respect is scarcely possible.

Artificial gums can be made in a series of batches amounting to several charges per day, but natural gums have taken long periods in the earth's history to complete. But still the process in both cases is unmistakeable. Through slow running reactions of the individual constituents with one another over a long period of time by unknown but presumably suitable conditions, a mixture has resulted which in regard to structure and reactivity has produced gums, in all probability from compounds with very large molecules.

Quite analogous are the relations in hard artificial gums, only that the reactions are influenced and accelerated by heat and pressure. It is unnecessary to assume that heat and pressure acted in the ripening of natural gums, although these factors have been prominent in the earth's history. Chemical reactions which can be forced to take place quickly by the application of heat and pressure, may proceed extremely slowly under normal relations but will lead to a similar end results.

The Late Mr. Andrew Campbell

We regret to announce the death, at the early age of 43, of Mr. Andrew Campbell, managing director of Honeywill Brothers, Ltd., and also a director of British Industrial Solvents, Ltd. The death occurred on January 16 at Guy's Hospital, following an operation. Mr. Campbell was buried on Sunday, January 18, at Kirkliston, near Edinburgh.

Silica Gel

History of an Outstanding Achievement

Of great interest in the field of chemical technology, a correspondent writes, is the history and development of a product with important possibilities in many branches of industry, which, but for the horrors of gas warfare, would in all probability have remained the laboratory curiosity it had been previously for many years.

We refer to Silica Gel. It will be remembered that the British scientist Graham, who is reputed to have coined many scientific words and terms which have long since passed into common usage, such as "colloid" and "crystalloid," was the first to investigate gelatinous silicic acid, and to this substance he gave the name "Silica Gel" in his publications.

Although it was generally known that the material possessed characteristics useful in the industrial arts, the gels of silica and the processes of making them remained, as indicated, for over half a century the subject of laboratory investigation, and did not find any commercial use. The first Silica Gel was prepared by Graham in 1860, using the dialysis method, and subsequently on the same lines by Zsigmondy, Fleming, Anderson, and others, including Patrick in 1924, but from a commercial point of view the method was, and is, impracticable. Much of the work during this long period stopped at the hydrogel (the relatively stiff jelly-like homogeneous mass), which was used in the wet state by Poulsen as a cement material, and in quite recent years by a Norwegian firm as a base for non-alkaline tooth-paste. The use of the hydrogel in connection with the refining of beer and light wines has also been suggested, and is believed to be employed in the construction of non-spillable storage batteries.

Ullik succeeded in washing the hydrogel and then drying it in the air, but his product could only absorb water vapour from the air to the extent of 2·6 per cent. of its weight, that is, less than one-tenth of the absorption power required in commercial practice from a useful high absorptive gel.

Also the gels examined by Van Bemelen could not be heated up to high temperatures without suffering a remarkable loss in their powers of absorption, and were after re-activation, unfitted for further use in a continuous adsorption cycle. Much work was done in the direction of drying the hydrogel over sulphuric acid, but this method also proved unsuitable for commercial production on a large scale.

Its Use in Gas Masks

Since Graham, much of the laboratory investigation has been done in Germany, and an interesting point is that although the Germans were in possession of all the knowledge that existed on the subject of Silica Gel, they did not produce it for one of its now recognised uses, that is, gas masks and protection against poison gases, which shortly after the outbreak of the war in 1914 provided the scientific world with a new problem of the utmost importance, the manufacture of absorbent materials for gas warfare. There had also been urgent need in many branches of industry for a material having the properties that Silica Gel possesses, but, in spite of all the work concentrated upon the subject, the problems were not solved until Patrick in 1918 was able to evolve a practical process for the manufacture.

Dr. Walter A. Patrick, who had previously studied in England and Germany under Donnan and Zsigmondy, was in 1917—and still is—professor of Chemistry at the Johns Hopkins University, Baltimore, where he became associated as a consulting chemist with the Chemical Warfare Service of the Allied Armies. The supply of active charcoal being restricted, it occurred to him that Silica Gel might be used as a substitute for, or in connection with, charcoal in gas masks. He was already familiar with Silica Gel, prepared by the old dialysis method, and set himself to devise a practical process for its manufacture in substantial quantities.

After numerous failures, there was invented the process by which is produced the uniform, highly porous, hard gel of silica, of transparent glassy appearance, which is stable at high temperatures, to which was also given the name "Silica Gel" originally used by Graham.

Although Patrick's practical solution of the problem came too late to be of use before the Armistice, all the trouble expended has been well repaid, and few products have aroused such widespread attention or have experienced such divergent applications and developments as Silica Gel in the decade since the publication of Patrick's patent early in 1919. That patent has been the precursor of several hundred others covering improvements and applications, with innumerable ramifications spreading throughout the fields of dehydration, catalysis, oil refining, hydrogenation, solvent recovery, and transportation refrigeration. Many others will undoubtedly follow.

The reader has but to refer to the lists of patents which are published periodically to find numerous references to Silica Gel, active or absorbent silica, their manufacture, and particularly their uses incorporated in the claims of inventors of all nations skilfully harnessing the substance they long needed to their own special purposes, and an extensive bibliography on the subject has also accumulated to which additions are continually being made.

I.C.I. Employee's Bravery

Awarded the Edward Medal

It was announced in *The London Gazette* last week that the King has awarded the Edward Medal to George Tolson, in recognition of his gallantry on July 26 last, when one of a series of large tanks about 18 inches apart, containing acetic acid, exploded at the works of Synthetic Ammonia and Nitrates, Ltd., Billingham.

In the official account of the circumstances, it is stated that the works fire squad, under George Tolson, attacked the burning acid, and in about 15 minutes had the fire under control. Tolson's attention was then called to a smouldering object lying between the burst tank and the next one. He went nearer, and saw that it was a man. Exposing himself to serious risk, Tolson drew his coat collar about his throat and rushed into the narrow space between the tanks in an attempt to rescue the burning man.

On reaching the man, Tolson found that he had been caught by the hand, and he was unable to release him without assistance. A second rescuer then joined Tolson, who was by this time so severely burned by the escaping acid and so overcome by the fumes that he was forced to leave the place and go into the fresh air. His place was taken by a third man wearing breathing apparatus, and the rescue was then completed.

"It is estimated," adds the statement, "that Tolson was exposed to risk from escaping acid and fumes for about five minutes, and in that period he was severely burned by the acid and was partially overcome by the fumes."

The Chemist in the Library

An example of the services that the research chemist renders in side-lines is supplied by Leaflet No. 69 on the "Preservation of Leather Bindings," prepared by Mr. R. W. Frey (chemist) and Mr. F. P. Veitch (principal chemist in charge) of the Industrial Farm Products Division of the U.S.A. Bureau of Chemistry and Soils. The leaflet describes in detail the kinds of decay and deterioration that leather bindings are subject to, and suggests various methods for their prevention and treatment by the use of dressings, the basis of which is some oil or grease of guaranteed purity. Several formulæ are published of suitable preparations. In advanced cases of decay, where the binding has become powdery, the dressing may be followed by treatment with a thin cellulose-nitrate lacquer. The leaflet may be obtained from the Superintendent of Documents, Washington, D.C., for 5 cents.

Institute of Metals

At the annual general meeting of the Institute of Metals, to be held on March 11–12 in London, fourteen papers, covering a wide field of metallurgical work, will be presented for discussion. In the evening of March 11 the annual dinner and dance of the Institute will be held at the Trocadero Restaurant. The Institute has just issued the first number, dated January, 1931, of its new monthly journal containing original articles, Institute news, and several hundreds of abstracts of the world's metallurgical literature. Henceforward the volumes issued each June and December will contain only "Proceedings," and the "Abstracts" will appear monthly.

The next election of members is on February 20, and persons then elected have the privilege of membership, not for the usual twelve months, but for the extended period ending June 30, 1932.

Chemical Trade in 1930

Manchester Chamber of Commerce Review

THE report of t Chemical and Allied Trades Section of the Manchester Ch ..ber of Commerce refers to the fall during 1930 both in the home consumption and the exports of chemicals, although it was less severe than those in some other industries. In regard to the Dyestuffs Act, it is hoped that recent developments will at least provide a means whereby the uncertainty which has been so great a hindrance to trade may be ended and the interests concerned may be able to adjust matters affecting them. The merchanting of chemicals, it is added, is beset with difficulties which arise from changes in sources of supply arising from new methods of manufacture. The recent extensive manufacture of acetic acid by catalytic processes and of acetone by controlled fermentation, all formerly the products of wood distillation, is quoted as a case in point.

The section has re-elected its officers :—Mr. J. Allan, chairman, Mr. Forrest Hewit, vice chairman, and Mr. A. Heywood, hon. secretary.

Prison for Selling Worthless "Disinfectant"

SENTENCE of nine months imprisonment was passed by the Skipton magistrates on Wednesday, January 14, on William Kershaw, of 51, Lillands Lane, Brighouse, who appeared on three charges of obtaining money by false pretences. 476 other similar cases in different parts of the country and involving a sum of £120, were taken into consideration.

The fraud took the form of the sale of 6d. packets of what was represented to be disinfectant, and the name of a firm styled the Yorkshire Chemical Co., of Wicker, Sheffield, was used on the packets. The disinfectant was found to be worthless, and the firm did not exist.

"Hysol," as the contents of the packets were named, was said by Harry Hudson, chemist, Haworth, to be made up of nothing but crude whiting or chalk, with a trace of colour and a small percentage of coal-tar salts of the napthalene class. Its disinfectant qualities were practically negligible.

For the defence Mr. G. B. Harrison stated that accused sold the stuff as "Cleansit" for eight years without complaint, and as trade was falling off he decided to alter the name to "Hysol" and publish the name of a firm on the packet. His real offence was mentioning a firm that did not exist.

Index to British Standard Specifications

THE 1931 edition of the Index to British Standard Specifications has just been issued. It is a complete subject index which, in view of the large number (410) of British Standard Specifications now available, some of which include provisions for several articles or materials, will be of much assistance to those purchasing engineering and allied material apparatus and machinery. A numerical list of the specifications is also included. The list, which covers 38 pages, shows the wide range of subjects covered by the British Standard Specifications and should be of value in drawing offices and contracts departments. Copies are available from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 1s. 2d. post free. To assist in the wider adoption of the British Standard Specifications, the Association has again taken accommodation at the British Industries Fair, Birmingham (Stand 16 G 3).

Roadway Time Tables

THE rapid development of road traffic in this country is illustrated by the issue of the second winter edition of *Roadway Motor Coach and Motor Bus Time Tables* (published by Roadway Time Tables and Publications, 1s.). Some 4,020 services are included, the express section occupying 25 pages of index, and the general section 83 pages. The tables themselves run into 900 pages. The handbook (which is a sort of roadway Bradshaw) indicates modifications in through running times to comply with the Road Traffic Act. In order to meet the requirements of the public, some of the big motor coach companies are contemplating the provision of cars carrying six or seven passengers, to which vehicles no arbitrary speed limits apply, thus ensuring a quicker service for long-distance journeys. Owing to the smaller capacity of these cars, probably a higher fare scale will apply.

The Dyestuffs Act

Government Sees No Advantage in Another Inquiry

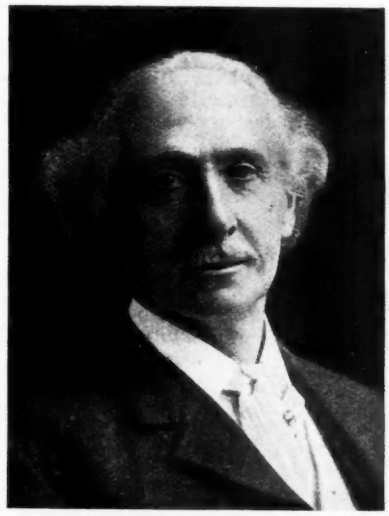
THE President of the Board of Trade (Mr. W. Graham), was questioned by Members in the House of Commons on Tuesday as to what steps were proposed for setting up a committee of inquiry into the operation of the Dyestuffs (Import Regulation) Act. In reply he stated that the subject had been fully explored already and he saw no advantage in instituting another inquiry.

Mr. Brockway asked if an inquiry was not desirable with a view to safeguarding wages and prices and as to the national control of the industry.

Mr. Graham.—That is rather a separate issue. I am dealing here with the point which was before the House on the last occasion, and certainly at the moment, having regard to the very full review of the statutory committee under the Act, I can promise no other inquiry.

Sir Dennis Herbert asked if that meant that the Government did not see any prospect of getting support for the policy which they pursued on this question a few weeks before Christmas.

The Late Mr. F. W. Follows



FOUNDER of Follows and Bate, Ltd., Manchester, who died on January 12, aged 91. An account of his career appeared in our last issue.

Chinese Fertiliser Consumption

DURING the 1930 summer season unconfirmed announcements by the Chinese Ministry of Agriculture involved instructions to the provincial bureaux of agriculture to use only artificial fertilisers approved by the Ministry's Agricultural Products Examination Bureaux in Shanghai and Canton. This announcement is in keeping with agitation by Chinese well informed on the extent of soil depletion and unsuitability of imported fertiliser materials. Available data indicate the importation of artificial fertilisers increased ten times in a period of eight years. This suggested the development of an inde endent fertiliser industry in China although prospects are not at present favourable for the inauguration of this industry.—U.S. Commercial Attaché Julean Arnold, Shanghai.

Algeria's Copper Sulphate Imports

ENGLAND was the second largest supplier of copper sulphate during 1929 to Algeria, where it is mixed with lime and sodium carbonate for spraying vines and citrus trees. Of the 7,374 metric tons imported during the year France was the main source of supply with approximately 51 per cent. of the total, England next with 22 per cent., Italy third with 17 per cent., and Belgium fourth with 10 per cent. There are no imports of copper sulphate from the United States, although frequent efforts have been made to secure a portion of this trade.

From Week to Week

A WALL CALENDAR for 1931 has been received from the Neville Co., formerly the Neville Chemical Co., of Pittsburgh.

EMPLOYEES of Nobel's Ardeer Factory (Imperial Chemical Industries), Stevenston, contributed £773 to infirmaries and other charitable institutions in 1930.

MR. ARTHUR R. ROBERTS, chief chemist of the Albion Steelworks, Briton Ferry, Glam., who has retired, last week received presentations from the officials and staff of the firm.

MR. F. BRIERS, senior staff research chemist at Billingham, is on the short list of six selected, out of 182 applicants, for the post of Assistant Director of Education in Middlesbrough.

THE NATIONAL BENZOLE CO. was fined £25 at Haverfordwest last week for allowing one of their vessels, the "Ben Robinson," to discharge oil into the sea within 50 miles of the shore.

LORD AND LADY MELCHETT left London on Sunday night for a visit to Rome and Naples, and they expect to be back in London on February 9. The tour, it is understood, is being undertaken for the benefit of Lord Melchett's health.

SIR HARRY McGOWAN, the new chairman of Imperial Chemical Industries, Ltd., has also been elected to succeed the late Lord Melchett as President of the Society of Chemical Industry, and will preside over the jubilee celebrations of the Society in London this year.

A SUSPENSION OF PAYMENTS until March 31 is reported to have been granted to Prince Hans Heinrich of Pless for his nitrate works at Waldenburg which were unable to satisfy their creditors. Both the Reich and Prussia are expected to give financial help to the undertaking, which, according to expert opinion, could be made to pay if the plant were fully occupied and extended.

R. CRUICKSHANKS, LTD., chemical manufacturers, of Camden Street, Birmingham, inform us that, owing to increasing sales in the London district, they have been compelled to move from the old branch premises in Little Dean Street, London, and open their own showrooms at 123, Gray's Inn Road, with warehouses and loading facilities at the rear, and a shop for retail sales.

THE SECRETARY FOR MINES announces that he has appointed Mr. H. W. Cole, Director of the Petroleum Department, to be Deputy Under Secretary for Mines, and Mr. F. C. Starling to be Director of the Petroleum Department *vice* Mr. Cole. Mr. D. B. Woodburn has been appointed Secretary to the Safety in Mines Research Board, in place of Mr. A. D. Stedman, promoted to another appointment.

A LARGE WALL SHEET (6 ft. by 2 ft. 6 in.), prepared by Mr. W. H. Barrett, M.A., Assistant Science Master at Harrow School, has been issued by John Murray, Albemarle Street, London. It sets out the Periodic Table and Atomic Numbers (after Bohr), Periodic Table and Atomic Weights (after Mendeleef), and charts showing the Periodicity of Atomic Volumes (after Lothar Meyer) and Melting Points and Atomic Numbers.

AT THE MEETING of the Grand Council of the Federation of British Industries, on Wednesday, January 14, a resolution was passed, all present standing in silence for one minute, recording the sense of the loss which British industry has suffered through the death of Lord Melchett, and expressing sincere sympathy with his firm and his family. Sir James Lithgow has been nominated for a second year's office as president of the Federation, and Sir Arthur Duckham has been recommended as deputy president with a view to his becoming president in 1932.

A CONFIDENTIAL report on the market for chemicals, drugs and sundries in Portuguese East Africa has been prepared by the Department of Overseas Trade from information furnished by His Majesty's Consul-General at Laurenço Marques, and may be obtained from the Department on quoting Ref. No. B.X. 6,978. A similar report on the market for disinfectants, insecticides and animal dressings in Guatemala has been prepared by the British Vice-Consul (Ref. No. B.X. 6,971), and another on the market for paints and varnishes in Cuba, by the Acting British Consul-General at Havana. (Ref. No. B.X. 6,986.)

AN AGREEMENT for the regulation of prices for acetate rayon has resulted from negotiations between the Farbenindustrie, Aceta and Tubize concerns.

RECENT WILLS include Mr. James Andrew Rothwell, Brentwood, Walkden, Lancashire, cotton manufacturer, dyer and bleacher (net personalty, £2,031), £48,154.

APPLICATIONS FOR PATENTS last year numbered 39,298, or 600 fewer than in 1929, but a considerable advance on the 1928 figure of 38,556, the largest number for any year up to that date.

THE OLDEST German cellulose factory, established in 1877 at Münden by Professor Mit Scherlich, is announced to have filed a petition in bankruptcy, efforts to reach a settlement by agreement having failed.

TWO FATAL ACCIDENTS occurred in chemical works during December, out of a total for the month of 221 persons killed during the course of their employment in all other industries, in Great Britain and Northern Ireland.

THE BURSTING of a pipe joint at the chemical works of L. B. Holliday and Co., Ltd., Huddersfield, on Saturday, resulted in Mr. M. Gannon, a foreman, receiving severe burns on the shoulders, and he was taken to the Infirmary and detained.

THE GERMAN BEMBERG rayon works have been rendered idle owing to a wages dispute, and the company has made an agreement by which its stocks of raw material are to be worked up at the I.G. Farbenindustrie works at Dormagon, thereby making it possible to continue deliveries to customers.

UNEMPLOYED in the chemical industry of Great Britain and Northern Ireland on December 22 last numbered 18,517, or 17·9 per cent. of the total number of insured people in the industry. This is an increase of 2 per cent. during the month and 11 per cent. compared with the figures of a year before. In the explosives industry last month there were 13·1 per cent. unemployed, in the paint, varnish and red and white lead industries 8·7 per cent., and in the oil, glue, soap, ink and match and kindred industries 9·8 per cent.

DURING THE NEXT FEW WEEKS, firms engaged in productive work throughout Great Britain will be receiving forms to be filled in under the Census of Production Act to enable the quantity and value of the commodities making up the industrial output of the country to be measured. The new census will provide the opportunity of finding out accurately the changes which have taken place since 1924, when the last census was taken, and furnish a new starting point for estimating the quarterly index figures of production.

A BOOKLET of "Hints for Commercial Visitors to Turkey" (Ref. No. C.3408), giving a great deal of practical and necessary information as to local conditions, charges, customs, etc., for those wishing to visit or establish business relations in Turkey has been prepared by the Department of Overseas Trade, from information obtained from the Commercial Secretary at H.M. Embassy at Istanbul. A similar volume relating to Portuguese East Africa has also been prepared for the Department by H.M. Consul General at Laurenço Marques. (Ref. No. C.3416.)

UNIVERSITY NEWS.—*Cambridge*.—Frederick George Mann, Ph.D., of Downing College, Assistant to the Professor of Chemistry, has been elected to a Fellowship of Trinity College. *Manchester*.—The following recommendations for the conferment of honorary degrees were approved by the University Court on Wednesday: LL.D., Professor Arthur Harden, D.S.C., Ph.D., F.R.S., Professor of Biochemistry, University of London, and head of the Biochemical Department, Lister Institute; D.Sc., Sir James Hopwood Jeans, M.A., D.Sc., LL.D., F.R.S., a former secretary of the Royal Society.

A MEETING was held on Friday, January 16, between representatives of the Cast Concrete Products Association and the Building Research Station, Watford, to discuss a programme of investigations that the latter have been asked to carry out on the causes of certain troubles to which cement products are liable. The Association wishes to establish a scientific technique for the use of the products and a further improvement in method of manufacture. Another research which the Station is undertaking is the collection of all available information regarding greystone lime. The inquiry will include research into the hydraulic and plastic properties of lime and the technique of burning and slaking it.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

338,412. ANTHRAQUINONE DERIVATIVES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, December 22, 1928.

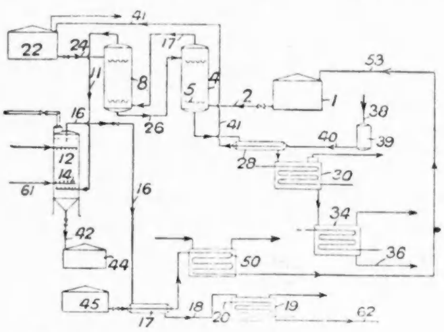
The leuco derivative of an oxyanthraquinone, or the anthraquinone compound with a reducing agent, is heated with boric acid and a primary aromatic amine to obtain an arylamino-anthraquinone. The products are acid dyestuffs for animal fibres, artificial silk, resins, varnishes, etc. A number of examples are given.

338,469. ALKALI CHROMATES. Mutual Chemical Co., of America, 270, Madison Avenue, New York. Assignees of O. F. Tarr, 3021, Iona Terrace, Baltimore, Md., U.S.A. International Convention date, April 3, 1929.

A mixture of chrome ore, lime and soda ash is heated in a furnace, the amount of soda ash being insufficient for complete decomposition. The product is leached and the residue then treated again, sufficient soda ash being used to extract all the chromium. The amount of lime is sufficient to prevent fusion, and to form some alkali silicate and aluminate.

338,482-3-4. PURIFYING HYDROCARBON OILS. W. W. Triggs, London. From Pan American Petroleum Co., 10th Street, Los Angeles, U.S.A. Application date, May 7, 1929.

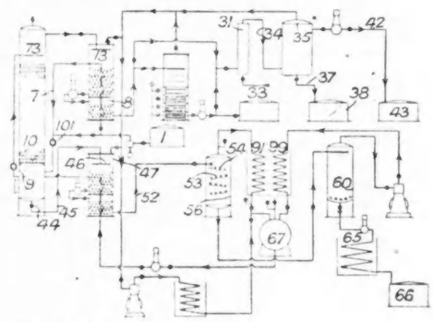
338,482. Oils are treated below 32° F. with liquid sulphur dioxide, the oil is separated and treated with fuming sulphuric acid, and the purified oil then separated from sulphur dioxide and sulpho acids. The oil passes from a tank 45 through heat



338,482

exchanger 17, and pipe coil 50, where it is cooled by liquid sulphur dioxide to 17° F., and thence to tank 1. The oil then passes through a tower 4 in counter-current to liquid sulphur dioxide from a second tower 8. The oil then passes through the tower 8 where it is treated with liquid sulphur dioxide from a tank 2. The treated oil then passes to the tower 12, through which it passes against a spray of fuming sulphuric acid. The purified oil then passes through heat exchanger 17 to evaporator 19 where sulphur dioxide is liberated to be ultimately returned to container 39. The sulphur dioxide passes from the tower 4 through heat exchanger 28 to cool the incoming sulphur dioxide, and then through evaporators 30, 34 where sulphur dioxide is removed.

338,483. In this case the oil is treated with liquid sulphur dioxide in a single tower. Oil from tank 1 is cooled to 17° F. in a heat exchanger 8 by means of oil from the tower 9. The cooled oil is then passed to the base of the tower 9 through which it passes against liquid sulphur dioxide. The oil passes to a tower 31 where it is mixed with sulphuric acid, and thence to settling tank 35. The purified oil then passes to tank 43 for treatment with alkalies, or distillation. The sulphur dioxide containing hydrocarbons passes from a tower 9 to heat exchanger 47 to cool the incoming sulphur dioxide from tank 67. The sulphur dioxide passes from heat exchanger 47 to the evaporators 56, 60 where sulphur dioxide is removed. The residue of unsaturated aromatic hydrocarbons is discharged



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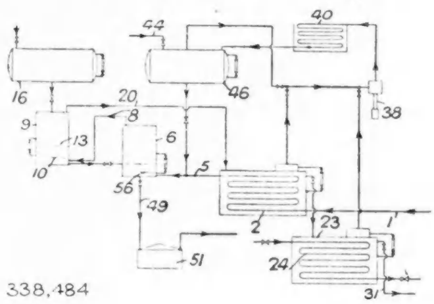
to tank 66, while the liberated sulphur dioxide passes through cooling coils 91, 99 to tank 67.

338,484. In this case the oil is treated with fuming or concentrated sulphuric acid and liquid sulphur dioxide simultaneously. The oil is cooled in a heat exchanger 2 to 17° F. by the outgoing purified treated oil from the tower 9, and then passes to tank 6 together with cooled liquid sulphur dioxide from tank 46. The mixture rises through the acid



338,484

sludge in the tank 6, and the partly treated oil passes to a tower 9 where it rises through the acid sludge and is treated with sulphuric acid from the tank 16. The purified oil passes through heat exchanger 2 to evaporator 23 where sulphur dioxide is removed, and the sulphur dioxide passes through compressor 38 and cooler 40 to tank 46. The purified oils may be treated with alkalies or sodium hypochlorite, and distilled.

338,486. DYES. W. Smith, S. G. Willimott, J. Thomas and Scottish Dyes, Ltd., Earl's Road, Grangemouth. Application date, May 13, 1929.

Anthraquinone tetrahydro-diphenazines are obtained by condensing α-α-dichlor-anthraquinones with *o*-nitraniline or α-α-diamino-anthraquinones with *o*-nitro-chlorbenzene by heating in an inert solvent in the presence of an acid absorbing agent and a copper catalyst, and treating the products with alcoholic sodium sulphide. The hydro-diphenazines may be oxidised to diphenazines. Several examples are given.

338,506. SYNTHETIC DRUGS. Sir W. J. Pope, Holmleigh, West Road, Cambridge. Application date, July 19, 1929.

Chloroauric acid, or gold hydroxide or a salt, or fulminating gold, are treated with succinimide in the presence of a base and in alcoholic solution, to obtain therapeutic compounds, several examples of which are given.

338,507. Acid Anhydrides. H. D. Elkington, London. From Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij, 30, Carel Van Bylandtlaan, The Hague. Application date, August 9, 1929.

Aliphatic monobasic acids mixed with monoketones, excluding ketone, or with substances which form monoketones, are heated to 600—700° C. by passage through a heated tube to obtain the anhydrides. Catalysts may be present such as copper, brass, or aluminium sulphate. Substances forming mono-ketones include isopropyl alcohol which forms acetone, secondary butyl alcohol which forms methyl-ethyl ketone, propylene oxide which forms acetone and propion-aldehyde, and methyl acetate which forms acetone and dimethyl ether. Examples are given of the production of acetic anyhydride and butyric-acetic anhydride.

338,518–9. Ketones. H. Dreyfus, 22, Hanover Square, London. Application date, August 19, 1929.

338,518. Aliphatic ketones are obtained by heating a mixture of vapour of aliphatic alcohol containing at least two carbon atoms, and oxygen or air to 250°—700° C., in the presence of a catalyst consisting of alkaline earth metal compounds, *e.g.*, oxides, hydroxides, carbonates, metaborates, ortho-, meta-, and pyro-phosphates and silicates of calcium, barium, and magnesium, on pumice or kieselguhr. The vapour of an aliphatic acid such as acetic acid may also be added.

338,519. Aliphatic ketones are obtained by heating the vapour of aliphatic alcohol containing at least two carbon atoms mixed with steam and/or the vapour of one or more aliphatic acids to 200°—700° C. in the presence of the same catalysts as in 338,518 above. The naturally-occurring forms of these compounds may be used. An example is given of the production of acetone.

338,534. Synthetic Rubber. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 17, 1929.

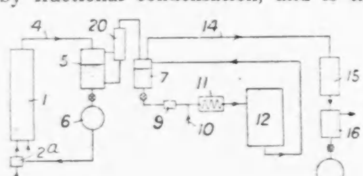
Diolefines are polymerized in the presence of alkali or alkaline earth metals or alloys in particles of uniform size obtained by sieving or by cutting the metal wire. The polymerization may be effected in the presence of dioxane, vinyl ethers or acetals. The reaction may be effected in a rotating autoclave, and some examples are given.

338,566. Nitric Acid. N. Caro, 97, Hohenzollerdamm, Dahlen, and A. R. Frank, 138, Kurfürstendamm, Halensee, both in Berlin. Application date, August 13, 1929.

Ammonia is oxidised with oxygen or gases containing it under normal pressure, and the nitrogen oxides are compressed to several atmospheres in a turbo compressor and converted under this pressure to nitric acid by condensation and absorption. The remaining gases may expand in a turbine coupled with the compressor.

338,576. Destructive Hydrogenation. C. F. R. Harrison and E. D. Kamm, Norton Hall, The Green, Norton-on-Tees, Durham., and Imperial Chemical Industries, Ltd., Millbank, London. Application date, July 16, 1929.

Heavy oil or coal is destructively hydrogenated, middle oil is isolated by fractional condensation, and is then treated



338,576

with hydrogen in the vapour phase in the presence of a catalyst to obtain petrol. A paste of coal and heavy oil with 2 per cent. of iron oxide is treated in a tower 1 with hydrogen at 420°—450° C. and 250 atmospheres pressure. All the products pass off at 4, and heavy oil is condensed in a vessel 5 at 350° C. and returned through filter 6 to the tower 1. The vapour from the vessel 5 consisting of 25 per cent. petrol and 35 per cent. middle oil passes to a fractionating column 20, from which middle oil is condensed in a vessel 7 at 250° C. The middle oil passes through pump 9 and heater 11, with hydrogen from pipe 10, and then through converter 12 containing tin plate as a catalyst, at 480° C. and 250 atmospheres pressure. The products pass to the vessel 7, and petrol from both hydrogenation stages passes to cooler 15 and vessel 16. A 50 per cent. yield of petrol is obtained.

338,595. Dyes. I.G. Farbenindustrie Akt.-Ges, Frankfort-on-Main, Germany. Application date, August 22, 1929. Addition to 306,843. (See The Chemical Age, Vol. XX, p. 432.)

Dyestuffs consisting of an aromatic base or a derivative or substitution product→a methylphenyl-pyrazolone or pyrazolone carboxylic acid derived from an amino-salicylic sulphone having the OH of the salicylic grouping in *o*-position to the sulphone bridge, are boiled with chromium salts to obtain water-soluble compounds. An example describes the treatment of the dyestuffs 2-chloraniline or 4-chlor-3-toluidine→ the methyl-pyrazolone from 2-amino-2^1-hydroxy-4-sulpho-3^1-carboxy-5^1-methyldiphenyl-sulphone.

338,604. Condensation Products containing Sulphur. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges, Frankfort-on-Main, Germany. Application date, August 24, 1929.

Oily or resinous condensation products containing the residues of polyvalent alcohols, polybasic acids and unsaturated carboxylic acids are treated with sulphur or agents yielding sulphur in amount up to 5 per cent., and at a temperature below 200° C. Several examples are given, the products being soluble in benzene, butyl acetate, drying oils and non-drying oils.

338,624. Methylene Ethers. Imperial Chemical Industries, Ltd., Millbank, London, T. Birchall and S. Coffey, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, August 30, 1929.

Hexamethylene tetramine is treated with mono-or dihydric alcohols, *e.g.*, methyl alcohol, ethyl alcohol, *n*-butyl alcohol, allyl alcohol, benzyl and substituted benzyl alcohols, ethylene and trimethylene glycols, in the presence of hydrochloric or sulphuric acid. Methylene ethers, including cyclic ethers, are obtained.

338,631. Diaryl Compounds. J. N. Carothers, T. J. Scott, and Federal Phosphorus Co., Anniston, Ala., U.S.A. Application date, September 5, 1929. Addition to 312,902. (See The Chemical Age, Vol. XXI, p. 114.)

Commercial benzol containing toluene and xylene is vaporized and heated to the maximum temperature at which substantially no diaryl compounds are formed, and then heated rapidly to 800°–850° C. The products are cooled quickly to prevent reversal of the process, and complex diaryl compounds having a higher boiling point than diphenyl are obtained.

338,638. Phenols. E. Perilhou, Avenue du Grand Condé, Lens, Pas-de-Calais, France. Application date, September 11, 1929.

Phenolic tar oils are treated with alkali carbonate solutions above 100° C., the carbon dioxide formed being allowed to escape. The phenates are isolated and decomposed with the carbon dioxide to obtain the phenols. Phenol may be separated from cresols by using a limited quantity of carbonate, which reacts more readily with phenol. Two detailed examples are given.

338,644. Fertilizers. J. Y. Johnson, London. From I. G. Farbenindustrie Akt.-Ges, Frankfort-on-Main, Germany. Application date, September 16, 1929.

Four molecular proportions of urea and one molecular proportion of calcium nitrate are melted or sintered together at 148°–150° C. and sprayed to obtain a granular fertilizer. Alternatively the fused mass may be comminuted when cold or the finely powdered ingredients may be treated in a rotary furnace at 100°–105° C.

338,672. Dyes. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, October 10, 1928.

The compounds produced by subjecting mono- or di-nitrobenzoylated diamino-arylsulphonic acids to a slight reduction such as is required to convert an aromatic nitro compound into an azo- or azoxy compound are diazotized and coupled with a coupling component. In an example 1-amino-4-(4^1-nitro-benzoylamino)-benzene-2-sulphonic acid is reduced, diazotized and coupled with 1-*p*-sulphophenyl-3-methyl-5-pyrazolone, the product dyeing cotton golden yellow.

338,742. ALKYL HALIDES. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij, 30, Carel van Bylandtlaan, The Hague. International Convention date, January 8, 1929.

Paraffin hydrocarbon and chlorine or bromine vapours are mixed in darkness at a low temperature and the mixture heated to obtain alkyl chlorides and bromides. The reaction vessel is preferably of enamelled metal or "pyrex" glass to avoid deposition of carbon. Examples are given of the preparation of pentyl, butyl, and propyl chlorides and butyl bromide.

Specifications Accepted with Date of Application

340,474. Polymerisation of diolefines. J. Y. Johnson. (*I.G Farbenindustrie Akt.-Ges.*) August 19, 1929.

340,475. Sulphate of alumina, Manufacture of. M. B. Robinson and Alumina Co., Ltd. August 23, 1929.

340,484. Aliphatic anhydrides, Manufacture of. British Celanese, Ltd., H. F. Oxley, and L. Fallows. September 23, 1929.

340,495. Cyclohexylamines, Manufacture of condensation products from. W. W. Groves. (*I.G. Farbenindustrie Akt.-Ges.*) September 30, 1929.

340,497. Refining of copper. Electrical Research Products, Inc. March 8, 1929.

340,498. Plating metals with aluminium or aluminium alloys. A. R. Hetzel and J. M. Hetzel. (*Vereinigte Silber-Hammerwerke Hetzel and Co.*) October 3, 1928.

340,503. Furthering chemical reactions between liquids and gases. L. Mellersh-Jackson. (*E. Connitz.*) June 22, 1929.

340,509. Anthraquinone and homologues of the same, Manufacture of. J. Y. Johnson and I.G. Farbenindustrie Akt.-Ges. August 19, 1929. Addition to 320,375.

340,513. Polymerisation of olefines. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) September 20, 1929.

340,519. 2-amino-3-substituted-10-anthrones and *n*-substitution products thereof, Preparation of. Newport Co. July 2, 1928.

340,524. Vat dyestuffs of the 1 : 2-benzanthraquinone series, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) July 29, 1929.

340,530. Hardening cast iron, Method of. W. Meacher. September 27, 1929.

340,534. Preparations useful for the production of dyestuffs, Manufacture of. W. W. Groves. (*I.G. Farbenindustrie Akt.-Ges.*) October 1, 1929.

340,550. Derivatives of carbazole, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) August 30, 1929.

340,585. Carbazole, Recovery of. I.G. Farbenindustrie Akt.-Ges. October 24, 1928.

340,587. Styrenes and their homologues, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) September 30, 1929.

340,598. Froth flotation concentration of minerals. H. Lavers and Minerals Separation, Ltd. October 2, 1929.

340,619. Ketone hydrazones of phenyl-hydrazine sulphonic acids, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) October 5, 1929.

340,632. High-grade nickel or nickel alloys, Production of. Berndorfer Metallwarenfabrik A. Krupp Akt.-Ges. April 29, 1929.

340,633. Vat-dyestuffs of the anthraquinone series, Manufacture of. A. Carpmael and I. G. Farbenindustrie Akt.-Ges. October 8, 1929. Addition to 198,077.

340,639. α-hydroxy-anthrones, Manufacture of. I. G. Farbenindustrie Akt.-Ges. October 17, 1928.

340,640. Azo-dyestuffs for wool, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) October 10, 1929.

340,641. Spongy iron from iron ores, Process and apparatus for the production of. F. Krupp Akt.-Ges. Friedrich-Alfred-Hutte. October 11, 1928.

340,656. Synthesis of alcohols. G. Natta. October 16, 1929.

340,661. Carboxylic acid arylides of the benzene series, Manufacture of. W. W. Groves. (*I.G. Farbenindustrie Akt.-Ges.*) October 18, 1929.

340,663. Sulphuretted hydrogen from gases, Removal of. C. J. Hansen. November 22, 1928.

340,682. Alkylated phenols, Manufacture of. Schering-Kahlbaum Akt.-Ges. November 29, 1928.

340,736. Treating gases containing sulphur dioxide from roasting furnaces to render innocuous combustible contact poisons, such as arsine. Metallges. Akt.-Ges. February 1, 1929.

340,787. Purification of the gases containing acetylene obtained by the treatment of carbonaceous substances in the electric arc. I.G. Farbenindustrie Akt.-Ges. January 16, 1929.

340,808. Zinc sulphide pigments, Production of. A. Wreschner and L. Wreschner (trading as A. Wreschner (Firm of)). January 25, 1929.

340,811. Obtaining valuable distillates by the destructive hydrogenation of carbonaceous materials. Standard Oil Development Co. January 22, 1929.

340,862. Ammonia, Manufacture of. Institut fur Physikalische Grundlagen der Medizin. March 1, 1929.

340,894. Welding magnesium and magnesium alloys. A. L. Mond. (*I.G. Farbenindustrie Akt.-Ges.*) March 31, 1930.

340,625. Derivatives of carbazole, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) August 30, 1929.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Barber, H. J., and May and Baker, Ltd. Manufacture of arsenobenzene derivatives. 1,639. January 17.

Bloomfield, A. L., and Pentecost, F. G. Apparatus for effecting chemical reactions by aid of heat. 1,285. January 14.

Bloxam, A. G., and Soc. of Chemical Industry in Basle. Manufacture of preparations containing higher fatty acid derivatives. 1,174. January 13.

Boulton, Ltd., W., and Gaskell, T. H. Drying china-clay. 1,604. January 17.

Burgess, G. E., and Burgess, Ledward and Co., Ltd. Dyeing. 1,602. January 17.

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of rubber-like mass. 1,329. January 14. (October 28, 1930.)

Chemical Engineering and Wilton's Patent Furnace Co., Ltd., Wilton, N., and Wilton, T. O. Manufacture of sulphate of ammonia. 1,177. January 13.

Chemische Fabrik vorm. Sandoz. Manufacture of wetting-out preparations. 1,521. January 16. (Germany, January 16, 1930.)

Coles, S. O. Cowper-. Protective coatings for aluminium and magnesium. 956. January 12.

—— Coating steel plates with metal. 957. January 12.

—— Plating. 958. January 12.

Coley, H. E. Manufacture of zinc. 1,016. January 12.

—— Production of volatile metals from ores. 1,574. January 16.

Du Pont de Nemours and Co., E. I. Intermediate and dyestuff. 1,002. January 12. (United States, February 11, 1930.)

Fawcett, E. W., Imperial Chemical Industries, Ltd., and Madel, W. R. Manufacture of hydro-aromatic hydrocarbons. 1,091. January 12.

—— Manufacture of aromatic hydrocarbons. 1,092. January 12.

Gas Light and Coke Co., and Griffith, R. H. Destructive hydrogenation of hydrocarbons, etc. 1,051. January 12.

Hammond, C. F., Parrish, P., and Shackleton, W. Production of ammonium bicarbon from ammoniacal gas liquor. 1,570. January 16.

Heaton, W. B., and Melvill, F. L. Cracking hydrocarbon materials. 1,503. January 16.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of artificial masses. 1,291. January 14.

—— Manufacture of fatty acid nitrile. 1,292. January 14.

—— Manufacture of metals from solid metal carbonyls. 1,621. January 17.

I.G. Farbenindustrie Akt.-Ges. Sizing. 1,025. January 12. (Germany, January 11, 1930.)

—— Photographic development. 1,173. January 13. (Germany, January 13, 1930.)

—— Manufacture of non-inflammable fibrous materials. 1,326. January 14. (Germany, January 15, 1930.)

Imperial Chemical Industries, Ltd. Electric dry batteries. 1,120. January 13.

—— Shot shells. 1,271. January 14. (Canada, March 6, 1930.)

—— Vulcanisation of rubber. 1,446. January 15. (United States January 15, 1930.)

—— Electric dry batteries. 1,536. January 16.

—— Manufacture of fertilisers. 1,537. January 16. (United States, January 17, 1930.)

Lush, E. J. Hydrogenation of fatty acids. 1,164. January 13.

Naugatuck Chemical Co. Preparation of carbon disulphide derivatives of alkylated piperidines. 1,567. January 16. (United States, March 28, 1930.)

Schimrigk, F. Plant for purification of sewage, etc. 1,477. January 16.

S. I. R. I. Soc. Italiana Ricerche Industriali. Removal of carbon oxysulphide from gases. 1,048. January 12. (Italy, January 21, 1930.)

Soc. d'Etudes Scientifiques et d'Entreprises Industrielles. Manufacture of fertilisers. 1,578. January 16. (Germany, February 6, 1930.)

Zinkhütte New-Erlaa Ges. Production of zinc white. 1,526. January 16. (Austria, January 21, 1930.)

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£19 per ton.

Acid Chromic.—1s. per lb., less 2½% d/d U.K.

Acid Hydrochloric.—Spot, 3s. 9d. to 6s. carboy d/d, according to purity, strength and locality.

Acid Nitric, 80° Tw.—Spot, £20 to £25 per ton makers' works, according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia (Anhydrous).—Spot, 11d. per lb., d/d in cylinders.

Ammonium Bichromate.—8½d. per lb. d/d U.K.

Bisulphite of Lime.—£7 10s. per ton, f.o.r. London, packages free.

Bleaching Powder, 35/37%.—Spot, £7 10s. per ton d/d station in casks, special terms for contracts.

Borax, Commercial.—Crystals, £13 10s. per ton; granulated, £12 10s per ton; powder, £14 per ton. (Packed in 1 cwt. bags. carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards).

Calcium Chloride (Solid), 70/75%.—Spot, £4 15s. to £5 5s. per ton d/d in drums.

Chromium Oxide.—9d. to 9½d. per lb. according to quantity d/d U.K.

Chrometan.—Crystals, 3½d. per lb. Liquor, £18 12s. 6d. per ton d/d U.K.

Copper Sulphate.—£25 to £25 10s. per ton.

Methylated Spirit 61 O.P.—Industrial, 1s. 7d. to 1s. 11d. per gall. pyridinised industrial, 1s. 9d. to 2s. 1d. per gall.; mineralised, 2s. 8d. to 2s. 11d. per gall. 64 O.P., 1d. extra in all cases. Prices according to quantity.

Nickel Sulphate.—£38 per ton d/d.

Nickel Ammonia Sulphate.—£38 per ton d/d.

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate Crystals and Granular.—4¼d. per lb. nett d/d U.K., discount according to quantity; ground ½d. per lb. extra.

Potassium Chlorate.—3¾d. per lb., ex-wharf, London, in cwt. kegs.

Potassium Chromate.—8⅛d. per lb. d/d U.K.

Salammoniac.—Firsts lump, spot, £42 10s. per ton d/d station in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.

Salt Cake, Unground.—Spot, £3 7s. 6d. per ton d/d station in bulk.

Soda Ash, 58° E.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.

Soda Caustic, Solid, 76/77°E.—Spot, £14 10s. per ton, d/d station.

Soda Crystals.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2-cwt bags.

Sodium Acetate 97/98%.—£21 per ton.

Sodium Bicarbonate, Refined.—Spot, £10 10s. per ton d/d station in bags.

Sodium Bichromate Crystals (Cake and Powder)—3½d. per lb. nett d/d U.K., discount according to quantity. Anhydrous ⅜d. per lb. extra.

Sodium Bisulphite Powder, 60/62%.—£16 10s. per ton delivered 1-cwt. iron drums for home trade: £15 10s. f.o.b. London.

Sodium Chlorate.—2¾d. per lb.

Sodium Chromate.—3⅜d. per lb. d/d U.K.

Sodium Nitrite.—Spot, £19 per ton, d/d station in drums.

Sodium Phosphate.—£14 10s. per ton, f.o.r. London, casks free

Sodium Silicate, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.

Sodium Sulphate (Glauber Salts).—Spot, £4 2s. 6d. per ton, d/d address in bags.

Sodium Sulphide Solid, 60/62%.—Spot, £10 5s. per ton d/d station in drums. Crystals—Spot, £7 10s. per ton d/d station in casks.

Sodium Sulphite, Pea Crystals.—Spot, £13 10s. per ton, d/d station in kegs. Commercial—Spot, £9 per ton, d/d station in bags.

Coal Tar Products

Acid Carbolic Crystals.—5d. to 6¼d. per lb. Crude 60's 1s. 4d. to 1s. 6d. per gall. August/December.

Acid Cresylic 99/100.—2s. per gall. B.P., 4s. per gall. 97/99.—Refined, 2s. 3d. to 2s. 5d. per gall. Pale, 98%, 1s. 9d. to 1s. 11d. Dark, 1s. 4d. to 1s. 5d.

Anthracene Oil, Strained (Green Oil).—4½d. to 4¾d. per gall.

Benzole.—Prices at works: Crude, 7½d. to 8½d. per gall.; Standard Motor, 1s. 3d. to 1s. 4d. per gall.; 90%, 1s. 4½d. to 1s. 5½d. per gall.; Pure, 1s. 7½d. to 1s. 8½d. per gall. (The above prices were operative from October 21 last).

Toluole.—90%, 1s. 9d. to 1s. 10d. per gall. Pure, 1s. 11d. to 2s. per gall.

Xylol.—1s. 8d. to 1s 9d. per gall. Pure, about 1s. 11d. per gall.

Creosote.—Standard specification, for Export, 5¼d. to 6d. per gall. f.o.b.; for Home, 4d. per gall. d/d.

Naphtha.—Solvent, 90/160, 1s. 3d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 5d. per gall. Solvent, 90/190, 1s. to 1s. 2d. per gall.

Naphthalene.—Purified Crystals, £11 11s. per ton.

Pitch.—Medium soft, 45s. to 47s. 6d. per ton, f.o.b., according to district. Nominal.

Pyridine.—90/140, 3s. 6d. to 3s. 9d. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—

Acid Amidonaphthol Disulpho (1-8-2-4).—10s. 9d. per lb.

Acid Anthranilic.—6s. per lb. 100%.

Acid Gamma.—Spot, 3s. 9d. per lb. 100% d/d buyer's works.

Acid H.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.

Acid Naphthionic.—1s. 5d. per lb. 100% d/d buyer's works.

Acid Neville and Winther.—Spot, 2s. 7d. per lb. 100% d/d buyer's works.

Acid Sulphanilic.—Spot, 8¼d. per lb. 100% d/d buyer's works.

Aniline Oil.—Spot, 8¼d. per lb., drums extra, d/d buyer's works.

Aniline Salts.—Spot, 8½d. per lb. d/d buyer's works.

Benzaldehyde.—Spot, 1s. 8d. per lb., packages extra, d/d buyer's works.

Benzidine Base.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.

Benzoic Acid.—Spot, 1s. 8½d. per lb. d/d buyer's works.

o-Cresol 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.

m-Cresol 98/100%.—2s. 9d. per lb., in ton lots.

p-Cresol 34·5° C.—1s. 9d. per lb., in ton lots.

Dichloraniline.—2s. 5d. per lb.

Dimethylaniline.—Spot, 1s. 8d. per lb., drums extra d/d buyer's works.

Dinitrobenzene.—7½d. per lb.

Dinitrochlorbenzene.—£74 per ton d/d.

Dinitrotoluene.—48/50° C., 7d. per lb.; 66/68° C., 7¾d. per lb.

Diphenylamine.—Spot, 1s. 8d. per lb. d/d buyer's works.

a-Naphthol.—Spot, 1s. 11d. per lb. d/d buyer's works.

B-Naphthol.—Spot, £65 per ton in 1 ton lots, d/d buyer's works.

a-Naphthylamine.—Spot, 1s. per lb. d/d buyer's works.

B-Naphthylamine.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-Nitraniline.—5s. 11d. per lb.

m-Nitraniline.—Spot, 2s. 6d. per lb. d/d buyer's works.

p-Nitraniline.—Spot, 1s. 8d. per lb. d/d buyer's works.

Nitrobenzene.—Spot, 6½d. per lb., 5-cwt. lots, drums extra, d/d buyer's works.

Nitronaphthalene.—9d. per lb.

R. Salt.—Spot, 2s. per lb. 100% d/d buyer's works.

Sodium Naphthionate.—Spot, 1s. 6½d. per lb. 100% d/d buyer's works.

o-Toluidine.—Spot, 8d. per lb., drums extra, d/d buyer's works.

p-Toluidine.—Spot, 1s. 9d. per lb. d/d buyer's works.

m-Xylidine Acetate.—3s. 4d. per lb., 100%.

Wood Distillation Products

Acetate of Lime.—Brown, £7 10s. to £8 per ton. Grey, £14 to £15 per ton. Liquor, 9d. per gall.

Acetone.—£74 to £75 per ton.

Charcoal.—£6 5s. to £8 3s. per ton, according to grade and locality.

Iron Liquor.—10d. to 1s. 2d. per gall

Red Liquor.—8d. to 10d. per gall.

Wood Creosote.—1s. 9d. per gall., unrefined.

Wood Naphtha, Miscible.—2s. 11d. to 3s. 1d. per gall. Solvent, 4s. per gall.

Wood Tar.—£4 5s. per ton.

Brown Sugar of Lead.—£37 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 6d. to 1s. 2d. per lb., according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

Arsenic Sulphide, Yellow.—1s. 8d. to 1s. 10d. per lb.

Barytes.—£6 to £7 10s. per ton, according to quality.

Cadmium Sulphide.—4s. 6d. to 5s. per lb.

Carbon Bisulphide.—£26 to £28 per ton, according to quantity; drums extra.

Carbon Black.—3¾d. to 4⅛d. per lb., ex wharf.

Carbon Tetrachloride.—£40 to £50 per ton, according to quantity. drums extra.

Chromium Oxide, Green.—1s. 2d. per lb.

Diphenylguanidine.—2s. 6d. per lb.

Indiarubber Substitutes, White.—4¾d. to 5½d. per lb.; Dark, 4½d. to 5d. per lb.

Lithopone, 30%.—£20 to £22 per ton.

Sulphur.—£9 10s. to £13 per ton, according to quality.

Sulphur Chloride.—4d. to 7d. per lb., carboys extra.

Sulphur Precip B.P.—£55 to £60 per ton, according to quantity.

VERMILION, PALE OR DEEP.—6s. 6d.–7s. per lb.
ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACETANILIDE.—1s. 3d. per lb. for 1-cwt. lots.
ACID, ACETIC, PURE, 80%.—£38 5s. per ton, for ½ ton lots, £37 5s. for 1 ton, smaller quantities £39 5s., delivered, barrels free.
ACID, ACETYL SALICYLIC.—2s. 7d. to 2s. 9d. per lb., according to quantity.
ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., for synthetic product, according to quantity. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.
ACID, BORIC B.P.—Crystal, £31 per ton; powder, £32 per ton; For one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—1s. 1½d. per lb., less 5%.
ACID, GALLIC.—2s. 11d. per lb. for pure crystal, in cwt. lots.
ACID, MOLYBDIC.—5s. 3d. per lb. in ½-cwt. lots. Packages extra. Special prices for quantities and contracts.
ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.
ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 8d. per lb. Technical.—1s. to 1s. 2d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—1s. 0½d. per lb., less 5%.
AMIDOL.—7s. 6d. to 11s. 3d. per lb., according to quantity.
AMMONIUM BENZOATE.—3s. 9d. per lb.
AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5-cwt. casks. Resublimated, 1s. per lb.
AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ½-cwt. lots. Packages extra. Special prices for quantities and contracts.
ARGENT. NITRAS, CRYSTALS.—1s. 1d. per oz.
ATROPHINE SULPHATE.—8s. per oz.
BARBITONE.—5s. 9d. to 6s. per lb.
BISMUTH CARBONATE.—7s. 6d. per lb.
BISMUTH CITRATE.—7s. 6d. per lb.
BISMUTH SALICYLATE.—7s. 3d. per lb.
BISMUTH SUBNITRATE.—6s. 6d per lb.
BISMUTH NITRATE.—Cryst. 5s. per lb.
BISMUTH OXIDE.—9s. 6d. per lb.
BISMUTH SUBCHLORIDE.—8s. 9d per lb.
BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts. 11d. per lb. Liquor Bismuth B.P., in W. Qts., 1s. 2d. per lb.; 6 W. Qts., 11½d. per lb.; 12 W. Qts., 10d. per lb.; 36 W. Qts., 9½d. per lb.
BORAX B.P.—Crystal, £21 10s per ton; powder, £22 per ton; for one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
BROMIDES.—Ammonium, 1s. 9d. per lb.; potassium, 1s. 4½d. per lb.; granular, 1s. 5d. per lb.; sodium, 1s. 7d. per lb. Prices for 1-cwt. lots.
CAFFEIN, PURE.—6s. 6d. per lb.
CAFFEIN CITRAS.—5s. per lb.
CALCIUM LACTATE.—B.P., 1s. to 1s. 4d. per lb., in 1-cwt. lots.
CAMPHOR.—Refined flowers, 2s. 10d. to 3s. per lb., according to quantity; also special contract prices.
CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.
EMETINE HYDROCHLORIDE.—58s. 6d. per oz.
EMETINE BISMUTH IODIDE.—33s. per oz.
EPHEDRINE, PURE.—12s. 6d. to 13s. 6d. per oz.
EPHEDRINE HYDROCHLORIDE.—9s. 9d. to 10s. 6d. per oz
EPHEDRINE SULPHATE.—9s. 9d. to 10s. 6d. per oz.
ERGOSTEROL.—2s. 6d. per gm.
ETHERS.—S.G. ·730—1s. to 1s. 1d. per lb., according to quantity; other gravities at proportionate prices.
FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.
GLUCOSE, MEDICINAL.—1s. 6d. to 2s. per lb. for large quantities.
HEXAMINE.—2s. 3d. to 2s. 6d. per lb.
HOMATROPINE HYDROBROMIDE.—27s. 6d. per oz.
HYDRASTINE HYDROCHLORIDE.—90s. per oz. for small quantities.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 3s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 2s. 11d. to 3s. 4d. per lb.; potassium, 3s. 2d. to 3s. 7d. per lb.; sodium, 3s. 1d. to 3s. 6d. per lb.; fo r28-lb. lots.
IRON AMMONIUM CITRATE.—B.P., 1s. 11d. per lb., for 28-lb. lots. Green, 2s. 6d. per lb., list price. U.S.P., 2s. 9d. per lb. list price.
IRON PERCHLORIDE.—18s. to 20s. per cwt. according to quantity.
IRON QUININE CITRATE.—B.P., 8½d. to 8¾d. per oz., according to quantity.
MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.
MAGNESIUM OXIDE.—Light Commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
MENTHOL.—A.B.R. recrystallised B.P., 13s. 6d. per lb. net; Synthetic, 8s. 6d. to 12s. per lb.; Synthetic detached crystals, 8s. 6d. to 10s. 3d. per lb., according to quantity; Liquid (95%), 9s. per lb.
MERCURIALS B.P.—Up to 1-cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 3d. to 1s. 5d per lb.
PARAFORMALDEHYDE.—1s. 8d. per lb.
PARALDEHYDE.—1s. 1d. per lb.
PHENACETIN.—3s. 9d. to 4s. 1d. per lb.
PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.
PILOCARPINE NITRATE.—10s. 6d. per oz.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—85s. 6d. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P., 1s. 9d. per lb. for 28-lb. lots.
POTASSIUM FERRICYANIDE.—1s. 7½d. per lb., in 125-lb. kegs.
POTASSIUM IODIDE.—16s. 8d. to 17s. 9d. per lb., as to quantity.
POTASSIUM METABISULPHITE.—50s. per cwt. d/dLondon, kegs free.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. per oz. for 1,000-oz. lots.
QUINOPHAN.—B.P.C., 14s. 6d. to 16s. 6d. per lb. for cwt. lots.
SACCHARIN.—43s. 6d. per lb.
SALICIN.—18s. 6d. per lb.
SODIUM BARBITONUM.—8s. 6d. to 9s. per lb. for 1-cwt. lots.
SODIUM BENZOATE B.P.—1s. 9d. per lb. for 1-cwt. lots.
SODIUM CITRATE.—B.P.C. 1911, 1s. 6d. per lb. B.P.C 1923, and U.S.P., 1s. 10d. per lb. for 28-lb.. lots.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—85s. per cwt. net, ton lots, d/s of 5 cwt. Crystals, 2s. 6d. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 3d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.
STRYCHNINE, ALKALOID CRYSTAL, 2s. per oz.; hydrochloride, 1s. 9½d. per oz.; nitrate, 1s. 8d. per oz.; sulphate, 1s. 9d. per oz., for 1,000-oz. quantities.
TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 2s. per lb.
THYMOL.—Puriss, 7s. 3d. to 8s. per lb., according to quantity. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—9s. per lb.
AMYL ACETATE.—2s. 3d. per lb.
AMYL BUTYRATE.—4s. 9d. per lb.
AMYL CINNAMIC ALDEHYDE.—9s. per lb.
AMYL SALICYLATE.—2s. 6d. per lb.
ANETHOL (M.P. 21/22° C.).—6s. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 9d. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 9d. per lb.
BENZYL BENZOATE.—2s. 4d. per lb.
CINNAMIC ALDEHYDE NATURAL.—11s. 9d. per lb.
COUMARIN.—12s. per lb.
CITRONELLOL.—6s. 6d. per lb.
CITRAL.—6s. 6d. per lb.
ETHYL CINNAMATE.—6s. 6d. per lb.
ETHYL PHTHALATE.—2s. 6d. per lb.
EUGENOL.—8s. 9d. per lb.
GERANIOL.—6s. to 10s. per lb.
HELIOTROPINE.—6s. per lb.
PHENYL ETHYL ACETATE.—10s. per lb.
PHENYL ETHYL ALCOHOL.—9s. per lb.
RHODINOL.—40s. per lb.
SAFROL—1s. 3d. per lb.

Prices of Essential Oils

ANISE OIL.—3s. 3d. per lb.
BERGAMOT OIL.—9s. 3d. per lb.
BOURBON GERANIUM OIL.—14s. per lb
CAMPHOR OIL.—White, 1s. 9d. per lb.; Brown, 1s. 3d. per lb.
CASSIA OIL, 80/85%.—4s. 3d. per lb.
CINNAMON OIL LEAF.—5s. 6d. per oz.
CITRONELLA OIL.—Java, 2s. 2d. per lb., c.i.f. Pure Ceylon, 2s. 2d. per lb.
CLOVE OIL, 90/92%.—8s. 3d. per lb.
LAVENDER OIL.—Mont Blanc, 38/40%, 9s. per lb.
LEMON OIL.—4s. per lb.
LEMONGRASS OIL.—3s. per lb.
PALMA ROSA OIL.—10s. per lb.
PEPPERMINT OIL.—Japanese, 4s. 6d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co. Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, January 22, 1931.

THERE has been a fairly satisfactory volume of business placed during the current weeks, and prices with minor exceptions continue firm and without much alteration. Steadiness in values is a feature of the markets at the present time. Export business is rather better.

General Chemicals

ACETONE.—There is a steady call, with prices a little steadier at about £60 to £65 per ton, according to quantity.

ACID ACETIC.—Continues in satisfactory demand, with prices firm at £36 5s. to £38 5s. for technical 80%, and £37 5s. to £39 5s. per ton for pure 80%.

ACID CITRIC.—In only small request, and price continues easy at about 1s. 2d. to 1s. 2¼d. per lb., less 5%.

ACID FORMIC.—Slow of sale, with price showing no change at about £38 per ton for 85%.

ACID LACTIC.—Demand is somewhat better, and price is unchanged at £41 to £42 per ton for the 50% by weight pale quality.

ACID OXALIC.—In good demand, with prices firm at £30 7s. 6d. to £32 per ton, according to quantity.

ACID TARTARIC.—Rather more business is coming to hand, with the market a shade firmer at 1s. 0½d. to 1s. 1½d. per lb., less 5%.

ALUMINA SULPHATE.—In steady call, mainly on contract account, with the market maintained at £7 15s. to £8 5s. per ton for the 17/18% iron-free quality.

ARSENIC.—The firm conditions continue, with supplies inclined to be difficult for early delivery. Price is firm at about £19 to £19 10s. per ton.

CREAM OF TARTAR.—There has been a little better demand, with the price steady at 87s. 6d. per cwt., ex warehouse London.

COPPER SULPHATE.—Price is unchanged at £22 to £22 10s. per ton, less 5%, free on rails London, with a small demand.

FORMALDEHYDE.—In fairly good request at about £30 10s. to £31 per ton, with a steadier tendency.

LEAD ACETATE.—Rather more business has been put through at the reduced prices of £33 15s. per ton for brown, and £34 15s. per ton for white.

LEAD NITRATE.—Unchanged at £29 10s. per ton, at which figure a small trade is passing.

LITHOPONE.—The market remains steady at about £18 to £22 per ton, according to grade and quantity, and there is a regular trade passing.

POTASSIUM BICHROMATE.—Firm at 4½d. per lb., with the usual discounts for contracts.

PERMANGANATE OF POTASH NEEDLE CRYSTALS B.P.—Unchanged at 5½d. per lb., and in steady demand.

SODA BICHROMATE.—Firm at 3½d. per lb net, with the usual discounts for contracts, and there is a fair trade.

SODA CHLORATE.—The market is firmer, at about £26 10s. per ton, with the product in good request.

SODIUM HYPOSULPHITE.—Commercial crystals are quoted unchanged at £8 10s. per ton, and in small demand, and photographic crystals at £14 5s. per ton, with a little better interest being shown.

SODIUM SULPHIDE.—Unchanged at £10 5s. to £11 5s. per ton for solid, with broken material £1 per ton extra, carriage paid.

TARTAR EMETIC.—Unchanged at about 11d. per lb.

ZINC SULPHATE.—Quiet at £11 to £11 10s. per ton.

Coal Tar Products

THERE is no alteration to report from last week. The market still remains inactive for coal tar products in general, and prices, although maintaining their level, are weak.

MOTOR BENZOL.—Remains at about 1s. 5½d. to 1s. 6½d. per gallon, f.o.r.

SOLVENT NAPHTHA.—Quoted at about 1s. 2½d. to 1s. 3d. per gallon.

HEAVY NAPHTHA.—Unchanged, at about 1s. 1d. per gallon, f.o.r.

CREOSOTE OIL.—Worth about 3d. to 3½d. per gallon, f.o.r. in the North, and 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Quoted at 1s. 8d. per gallon for the 98/100% quality, and at 1s. 6d. per gallon for the dark quality 95/97%.

NAPHTHALENES.—Unchanged at £3 10s. to £3 15s. per ton for the firelighter quality, at about £4 to £4 5s. per ton for the 74/76 quality, and at about £5 per ton for the 76/78 quality.

PITCH.—Obtaining 37s. 6d. to 42s. 6d. per ton, f.o.b. East Coast port.

Nitrogen Fertilisers

Sulphate of Ammonia.—Export.—During the past week there has been a better demand for prompt shipment, but there is very little interest in forward positions. Prices remain unchanged. *Home.*—There are indications that buyers are commencing to cover their spring requirements, but there is not any great volume of business to report.

Nitrate of Soda.—The schedule price for January is being maintained, but there is no improvement in the amount of business passing.

Latest Oil Prices

LONDON, January 21.—LINSEED OIL closed firmer at 2s. 6d. to 7s. 6d. advance. Spot, ex mill, £17 10s.; February, £16 2s. 6d.; March-April, £16 2s. 6d.; May-August, £16 7s. 6d.; September-December, £17 2s. 6d. RAPE OIL was inactive. Crude extracted, £29; technical refined, £30 10s., naked, ex wharf. COTTON OIL was slow. Egyptian crude, £20; refined common edible, £23; deodorised, £25, naked, ex mill. TURPENTINE was quiet and 3d. to 6d. per cwt. lower. American, spot, 35s. 6d.; February-April, 36s.; Russian, spot, 33s.

HULL.—LINSEED (closing prices), naked, spot, quoted £16; January, £15 15s.; February-April, £15 12s. 6d.; May-August, £15 17s. 6d.; and September-December, £16 15s.; East Indian, spot, unquoted; Baltic, spot, unquoted. COTTON OIL, naked, Egyptian, crude, spot, quoted £17 10s.; edible, refined, spot, £20; technical, spot, £20; deodorized, £22. CASTOR OIL, spot, 39s.; firsts, 34s.; and seconds, 32s. PALM KERNEL OIL, crude, naked, 5½ per cent., spot, £24. GROUNDNUT OIL, crushed-extracted, spot, £23; deodorised, £27. SOYA OIL.—Extracted-crushed, spot, £21 10s.; deodorised, £25. RAPE OIL, crushed-extracted, spot, £28 10s.; refined, spot, £30 10s. per ton. COD OIL, 18s. 6d. per cwt. TURPENTINE, 37s. 9d. per cwt.

South Wales By-Products

THERE is slightly more activity in South Wales by-products, but the stoppage in the coalfield is still affecting the market, and it is not likely that by-product activities will recover anything approaching normality for a few weeks. Pitch has a slightly better call, with values unchanged, but stocks are well in excess of demand. Refined tars have a fair call, with quotations unchanged for coke oven and gasworks tar. Road tar is unchanged, having a fair call round about 13s. per 40-gallon barrel. Solvent naphtha is in poor demand, with values unchanged, and a similar remark applies to heavy naphtha. Patent fuel and coke exports are slightly better, but are still far from satisfactory. Patent fuel prices, for export, are :—21s. 6d., ex ship, Cardiff; 20s., ex ship, Swansea and Newport; Coke prices are :—Best foundry, 34s. to 36s. 6d.; good foundry, 26s. to 30s.; furnace, 17s. 6d. to 21s. 6d.

Scottish Coal Tar Products

THERE is a marked improvement in the outlook of certain products, but meantime, very few price changes have become effective. The volume of business in this area has increased during the week.

Cresylic Acid.—The higher boiling fractions are in better demand. Pale, 99/100%, 1s. 7d. to 1s. 8d. per gallon; pale, 97/99%, 1s. 6d. to 1s. 7d. per gallon; dark, 97/99%, 1s. 5d. to 1s. 6d. per gallon; high boiling acid, 1s. 7d. to 1s. 9d. per gallon; all f.o.r. makers' works.

Carbolic Sixties.—Grades containing under 5% water are nominal at about 1s. 8d. per gallon.

Creosote Oil.—Conditions show an improvement and, with some large contracts in the offing, makers' prices are steady. Specification oil, 2½d. to 2¾d. per gallon; gas works ordinary, 3¼d. to 3¾d. per gallon; washed oil, 3d. to 3½d. per gallon; all f.o.r. makers' works.

Coal Tar Pitch.—Owing to scarcity of export orders distillers are concentrating on refined tars for road-making. Nominal value is 42s. 6d. to 45s. per ton f.a.s. Glasgow for export, and about 45s. per ton f.o.r. for home delivery.

Blast Furnace Pitch.—Market continues quiet with controlled prices at 30s. per ton f.o.r. works for home trade, and 35s. per ton f.a.s. Glasgow for export.

Refined Coal Tar.—Stocks are large and prices are easy at 2⅞d. to 3¼d. per gallon in buyers' barrels at makers' works.

Blast Furnace Tar is unchanged at 2¾d. per gallon f.o.r.

Crude Naphtha.—Value is steady at 4¼d. to 4½d. per gallon f.o.r. works in bulk.

Water White Products.—Benzol remains quiet but naphthas are in better call. Motor Benzol, 1s. 4d. to 1s. 4½d. per gallon; 90/160 solvent, 1s. 2½d. to 1s. 3½d. per gallon; 90/190 heavy solvent, 1s. 0½d. to 1s. 1d. per gallon; all f.o.r. in bulk quantities.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.*

Glasgow, January 20, 1931.

IN the Scottish heavy chemical market inquiries are for more or less immediate requirements, business in general being quiet.

Industrial Chemicals

ACETONE.—B.G.S.—£60 to £63 per ton, ex wharf, according to quality.

ACID, ACETIC.—Prices ruling are as follows: glacial, 98/100%, £47 to £58 per ton; pure, £37 5s. per ton; technical, 80%, £36 5s., delivered in minimum lots of 1 ton.

ACID, BORIC.—Granulated commercial, £22 per ton; crystals, £23; B.P. crystals, £31 per ton; B.P. powder, £32 per ton, in 1-cwt. bags, delivered free Great Britain in one-ton lots upwards.

ACID, HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. per carboy, ex works, full wagon loads.

ACID, NITRIC, 80° QUALITY.—£23 per ton, ex station, full truck loads.

ACID, OXALIC.—98/100%.—On offer at the same price, viz.: 3½d. per lb., ex store. On offer from the Continent at 3½d. per lb., ex wharf.

ACID, SULPHURIC.—£3 7s. 6d. per ton, ex works, for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID, TARTARIC, B.P. CRYSTALS.—Quoted 11¾d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted at round about £8 15s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton., c.i.f. U.K. ports. Crystal meal, about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 10½d. per lb., containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 80°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material obtainable at round about £31 per ton, ex wharf. On offer for shipment from China at about £29 per ton, c.i.f. U.K.

ARSENIC, WHITE POWDERED.—Quoted £21 per ton, ex wharf, prompt shipment from mines. Spot material still on offer at £22 5s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £9 10s. per ton, c.i.f. U.K. ports. For Continental materials our price would be £8 10s. per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 15s. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £4 15s. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—At about £3 15s. per ton, f.o.r. works, or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £33 per ton, ex store. Continental on offer at about £32 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 per ton, ex wharf.

LEAD, RED.—Price now £33 per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £46 per ton, carriage paid.

LEAD, ACETATE.—White crystals quoted round about £38 to £39 per ton ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE.—GROUND CALCINED.—Quoted £9 7s. 6d. per ton, ex store.

METHYLATED SPIRIT.—Industrial quality 64 o.p. quoted 1s. 8d. per gallon less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4½d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer, £25 10s. per ton ex store. Offered from the Continent at £24 15s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100% POWDER.—Quoted £25 per ton ex store; crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £20 17s. 6d. per ton, c i.f. U.K. ports. Spot material on offer at about £20 10s. per ton ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb. ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb. ex wharf.

SODA CAUSTIC.—Powdered 98/99%, £17 10s. per ton in drums, £18 15s. in casks. Solid 76/77% £14 10s. per ton in drums, £14 12s. 6d. per ton for 70/72% in drums, all carriage paid, buyer's station, minimum four-ton lots. For contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3½d per lb., delivered buyer's premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station; powdered or pea quality, 7s. 6d. per ton extra. Light soda ash, £7 13s per ton, ex quay, minimum four-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 2s. 6d. per ton, ex station, minimum four-ton lots. Pea crystals on offer at £15 per ton, ex station, minimum four-ton lots.

SODIUM NITRATE.—Chilean producers now offer at £9 18s. per ton, carriage paid, buyer's sidings, minimum six-ton lots.

SODIUM PRUSSIATE.—Quoted 5½d. per lb., ex store. On offer at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Price, 60s. per ton, ex works; 65s. od. per ton, delivered for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption: solid 61/62%, £10 per ton; broken, 60/62%, £11 per ton; crystals 30/32%, £8 2s. 6d. per ton, delivered buyers' works on contract, minimum four-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £9 5s. per ton, ex store.

ZINC CHLORIDE 98%.—British material now offered at round about £19 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Ontario Mineral Production

Increased Output during 1930

IN spite of a marked decline in the price of base metals, silver, and certain metals of the platinum group, mineral production in Ontario during the first half of 1930 reached a total value of $58,236,562, an increase of $2,738,401 as compared with the corresponding total for 1929. The mineral output for the entire year 1930 was expected to reach $117,000,000. Also, in spite of the well-marked decline in values, the output of metals from Ontario mines showed an increase of approximately $3,500,000 for the first half of the year, the total being $43,535,966 as compared with $39,996,164 for the first six months of 1929.

Gold production for the half-year showed an advance of $822,810 over the 1929 figures. Owing to the destruction of the Dome mill by fire in October, 1929, the half-yearly output of gold was about one and one-half million dollars below what it might have been. The total in gold for the 1930 period was $17,337,123 against $16,514,313 in the first half of 1929. Silver production increased by over 900,000 ounces to 5,121,749 ounces, valued at $2,108,172. Owing to the lower prices, this value compares with $2,345,349 for the smaller quantity in the 1929 half-year.

Copper, metallic, and tin concentrates, increased from 27,200,848 lb. in the 1929 period to 59,812,064 lb. in the first half of 1930, and the value from $5,141,180 to $7,392,371. Somewhat less copper was exported in matte, the figures being 8,542,734 lb. as against 10,614,194 lb. for the first six months of 1929, and the value of this item decreased from $1,650,470 to $1,067,841.

Nickel in matte exported increased from 15,043,447 lb. in the 1929 period to 21,313,584 lb. for the first half of 1930, and the value from $2,707,820 to $3,836,445. Nickel, metallic, decreased slightly in quantity at 33,799,941 lb. compared with 34,891,047 lb. in the 1929 period, but the value increased from $8,695,728 to $9,158,826. Nickel in oxides, residues and salts decreased from 6,503,062 lb. to 2,152,992 lb. and the value from $1,468,481 to $718,587. Platinum metals increased in value from $232,384 to $1,155,635.

Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, January 22, 1931.

CONDITIONS in the chemical market during the past week, so far as business in this district is concerned, have not been inspiring, the weaving dispute in the Lancashire cotton trade being a particularly depressing factor. Up to the present this may not have had much direct effect upon the demand for chemical products, but it certainly will have if the lockout extends for any length of time, as cotton trade disputes have a habit of doing. The general tendency of prices at the moment continues reasonably steady, about the only notable downward movement during the past week being in the lead acetate section.

Heavy Chemicals

Buying interest in phosphate of soda has been of limited extent, but at from £10 to £10 10s. per ton for the dibasic sort values are much the same as before. There is a moderate demand about for bicarbonate of soda, and prices are firm on a contract basis of £10 10s. per ton. Fair deliveries of caustic soda are reported, principally against contract commitments, with quotations ranging from £12 15s. to £14 per ton, according to grade. No more than a quiet business is going through in the case of sulphide of sodium, with the 60-65 per cent. concentrated quality offering at about £10 per ton, and the commercial kind at £8 10s. to £9. There is a moderate inquiry about for prussiate of soda and prices are well held at from 4⅝d. to 5¼d. per lb., according to quantity. A quietly steady demand is reported for bichromate of soda, offers of which are maintained on the basis of 3¼d. per lb., less 1 to 2½ per cent. discount, according to quantity. Salt-cake is in fair request at up to £3 5s. per ton. There is only a moderate call for chlorate of soda, without any quotable change in the price position, sales being made at round £26 10s. per ton. Alkali meets with a fair amount of inquiry, and values keep up at about £6 per ton. With regard to hyposulphite of soda, buying interest in this material is on the quiet side just now, but at up to £15 10s. per ton for the photographic sort and about £9 5s. for the commercial prices are maintained.

Among the potash products a quiet trade is passing in carbonate at from £25 to £25 10s. per ton. Interest in yellow prussiate of potash is on moderate lines and quotations are firm at from 6⅝d. to 7¼d. per lb., according to quantity. Permanganate of potash is moving in relatively small lots, without any change in prices, the B.P. quality being on offer at about 5¾d. per lb. and the commercial at 5¼d. Bichromate of potash is in quietly steady request on the basis of 4¼d. per lb. Only a quiet demand is about for chlorate of potash, which is on offer at round £27 10s. per ton. Caustic potash is attracting moderate attention, and at £28 10s. to £29 per ton values are reasonably steady.

Arsenic maintains its firmness, and up to £19 10s. per ton at the mines for white powdered, Cornish makes, continues to be asked for this material. The demand for sulphate of copper this week has been on quiet lines, with prices at about £21 per ton, f.o.b. The acetate of lead has been reduced to from £33 17s. 6d. to £35 15s. per ton, according to quantity, for the white material, and from £33 10s. to £34 15s. for the brown. Nitrate of lead, however, is unchanged at from £29 per ton. The acetates of lime meet with no more than a quiet demand, with prices easy in tendency at from £7 5s. to £7 10s. per ton for the brown quality and about £13 15s. for the grey.

Acids and Tar Products

Acetic acid is in fair request and prices are firm at £37 per ton for the 80 per cent. commercial product and £51 for the glacial. There has been no further change in citric acid, offers of which are at 1s. 2d. to 1s. 2¼d. per lb., nor in tartaric acid which is quoted at about 11¾d. Oxalic acid meets with only a quiet demand but prices keep up at round £1 12s. per cwt., ex store.

New business in pitch, both for home use and for shipment, is coming on to the books very slowly, and prices are easy and uncertain at from 40s. to 42s. 6d. per ton, f.o.b. Creosote oil is steady and in moderate request at from 3¼d. to 4¼d. per gallon, according to quality. Carbolic acid is attracting little attention, with offers of crude material at 1s. 3d. per gallon, naked, and of crystals at 5d. to 5¼d. per lb., f.o.b. Solvent naphtha is in moderate request at down to 1s. 2d. per gallon.

Company News

FAIRY DYES, LTD.—A dividend of 7½d. per share, less tax, is announced for the past year.

AMERICAN SMELTING AND REFINING CO.—A quarterly dividend of $1 per share has been declared payable on the common stock on February 2.

TIMOTHY WHITE'S (1928), LTD.—For the half-year ending January 31, 1931, an interim dividend at the rate of 10 per cent. per annum has been declared.

N. V. ANTON JURGEN'S VEREENIGDE FABRIEKEN.—A final dividend of 3 per cent. is announced, in respect of the year ended December 31, 1930, on all classes of preference shares, payable on and after February 2, 1931.

TAYLOR'S (CASH CHEMISTS), LTD.—A profit of £50,396 is reported for the past year. No final dividend is recommended on the deferred shares, so that the year's distribution is confined to the 10 per cent. interim payment.

ALLEN-LIVERSIDGE.—An interim dividend has been declared on the ordinary shares on account of the eight months ended December 31, 1930, of 3 per cent. (actual), less tax. A dividend at the rate of 6½ per cent. per annum, less tax, for the two months ended December 31, 1930, is to be paid on the preference shares.

ELECTROLYTIC ZINC CO. OF AUSTRALASIA.—The directors have decided not to declare a dividend on the ordinary shares for the half-year ended December 31 last, and to postpone the consideration of a payment of a dividend on the 8 per cent. cumulative participating preference shares until after the close of the current financial year.

Tariff Changes

BRITISH INDIA.—The revised customs tariff came into operation on January 1 last. The following chemicals are now free: Bleaching paste and bleaching powder, cinchona bark, magnesium chloride and sulphur. Copperas, green, pays 2½ per cent. *ad valorem*, and other chemicals, drugs and medicines not otherwise specified, 15 per cent.

CHILE.—Regulations have been approved regarding the preparation and importation of biochemical products for human or veterinary use, and a copy may be inspected at the Offices of the Department of Overseas Trade.

NEW ZEALAND.—The Regulations made on June 23, 1924, and February 21, 1927, under the Sale of Food and Drugs Act have been amended by an Order-in-Council, the articles affected including disinfectants, germicides, antiseptics and soap. The text of the amended Regulations may be seen at the Department of Overseas Trade, 35, Old Queen Street, London.

PARAGUAY.—A duty of 10.56 pesos per 1,000 has been imposed on imports of crude mineral oils of 14 degs. Baumé or less and residues of mineral oils for fuel, which were formerly free of duty.

Trial of a German "Gold Maker"

THE trial began at Munich on Monday of Franz Tausend, who is alleged to have swindled a number of people out of sums amounting to almost £100,000 in connection with a "gold making" process. Tausend was originally a plumber, but after reading some literature about the mediaeval alchemists, he suddenly announced that he had discovered the art of making gold. A limited company was formed to exploit his "invention" the financiers including men associated with science, commerce and industry.

During the hearing on Wednesday Professor Lautenschläger, of Frankfurt, gave evidence of Tausend's experiments, which included, besides the manufacture of gold, processes for the extraction of morphia from table salt. Herr Rienhardt, a Munich lawyer, said that he made the acquaintance of Tausend in 1924. The witness thought that there was something in the "gold-making" process, and in April, 1925, he put Tausend in touch with General Ludendorf, who visited him several times. On General Ludendorf's suggestion an expert was appointed to investigate the gold-making process. Apparently successful experiments were made by the expert, gold in pin-head size being produced even in the absence of Tausend, and from material which Tausend had not prepared.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgment

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

WOODLESFORD VARNISH CO., The Delph, Parkside, Bingley, varnish manufacturers. (C.C., 24/1/31.) £11 8s. 1d. November 28.

Declarations of Solvency

[*Registered under Section 230 of the Companies Act, 1929. It must be understood that (a) a company which has filed a Declaration of Solvency may be proposing to wind up with a view to reconstruction, and (b) it does not necessarily follow that a company which has filed such declaration will actually pass a resolution to wind up.*]

BIGLAND, SONS AND JEFFREYS (1927), LTD., 11, Rumford Street, Liverpool, general merchants, produce brokers, dealers in oil seeds and nuts, oils, fats, wool, cotton waste, soap making materials, etc. Declaration of solvency filed January 14, 1931.

LEONYTE, LTD., 13, Old Cavendish Street, W.1, manufacturers of synthetic substances, etc. Declaration of solvency filed January 13, 1931.

RALUCO, LTD., Vintry House, Queen Street Place, E.C.4, manufacturers of luminous preparations, paints, etc. Declaration of solvency filed January 10, 1931.

London Gazette, &c.

Company Winding Up

ANGLO-GERMAN PHARMACEUTICAL PRODUCTS CORPORATION, LTD. (C.W.U., 24/1/31.) Winding up order, January 19.

Companies Winding Up Voluntarily

ASSOCIATED CHINA CLAYS, LTD. (C.W.U.V., 24/1/31.) By special resolution, January 7.

CHINA CLAY PRODUCERS, LTD. (C.W.U.V., 24/1/31.) By special resolution, January 7.

GYPSUM AND PLASTER PRODUCTS CO., LTD. (C.W.U.V., 24/1/31.) Statutory meeting of creditors, January 20.

HYDRA-OXYGEN SMOKELESS COMBUSTION CORPORATION, LTD. (C.W.U.V., 24/1/31.) Members' voluntary winding-up, by special resolution, January 16. R. J. Climpson, Chartered Accountant, of 9, Copthall Avenue, E.C.2, appointed as liquidator.

NATIONAL FUEL OIL CO. (1921), LTD. (C.W.U.V., 24/1/31.) Statutory meeting of creditors, January 22.

NEW ZEALAND SULPHUR CO., LTD. (C.W.U.V., 24/1/31.) Statutory meeting of creditors at Winchester House, Old Broad Street, London, E.C.2 (Room No. 43), on Thursday, February 5, 1931, at 12.30 p.m.

OSMOS SALTS, LTD. (C.W.U.V., 24/1/31.) By reason of its liabilities, January 13. T. Frame Miller, C.A., appointed as liquidator.

PILCHERS, LTD. (C.W.U.V., 24/1/31.) Members' voluntary liquidation, by special resolution, January 16. Myles Gilbey Routledge, of The Down Farm, Stansted, gentleman, appointed as liquidator.

YEASTPIRIN, LTD. (C.W.U.V., 24/1/31.) By special resolution, January 15. J. C. Burleigh, Chartered Accountant, of 71, Queen Street, London, E.C.4, appointed as liquidator.

Bankruptcy Information

BOYD, Alexander, and WALTON, George, trading as ALEXANDER BOYD AND CO., manufacturing chemist, James Lane, Bath Street, Leith, Edinburgh. (S.B., 24/1/31.) Estates sequestrated January 16. First meeting of creditors January 28, at 2.30 p.m., Dowells' Rooms, No. 18, George Street, Edinburgh.

Partnership Dissolved

HOPE CHEMICAL WORKS (William Alfred Reynolds BOWICK and Edward Alfred Herbert WRIGHT), manufacturing chemists, at Anne Street, Barking Road, Plaistow, by mutual consent November 15, 1930. Debts received and paid by E. A. H. Wright, who will continue to carry the business under the old style.

New Companies Registered

DAVIS, GORDON AND CO., LTD.—Registered January 17. Nominal capital, £10,000 in £1 shares. To acquire the business of an indigo and colour dyer carried on by F. Davis at Old Lane Dyeworks, Old Lane, Halifax, as "Davis, Gordon and Co." Directors: F. Davis, Inglewood, Halifax, and Mrs. M. Davis.

J. B. BARNES AND SON (CAMDEN), LTD.—Registered January 16. Nominal capital £2,000 in £1 shares. Wholesale and retail chemists and druggists, chemical engineers, sterilisers, dyers, cleaners, makers of chemical plant and materials, charcoal manufacturers, etc. Director: L. R. Hayne, 205, Knightsbridge, London, S.W.7, chemist.

GOODLASS WALL AND CO., LTD., 42, Seel Street, Liverpool.—Registered as a "private" company on January 9. Nominal capital, £1,000 in £1 shares. Manufacturers of and dealers in refined pig lead, dry white lead, white lead in oil, white lead paint, red, orange and antimonial lead, copper slags, litharge, flake litharge, lead sheets and pipes, tea lead, lead foil, block tin, tin foil, lead shot, dry colours, coloured paints, bitumastic solution, ships anti-fouling composition paints, lead, merchants, manufacturers, smelters, and refiners, manufacturers and brokers of and dealers in paints, colours, varnishes, chemicals and mineral and other substances and materials used in the manufacture and preparation of paints, colours or varnishes, ship and house painters and decorators, etc.

THE ASSOCIATED LEAD MANUFACTURERS, LTD., 3, New London Street, London, E.C.3.—Registered as a "private" company on January 9. Nominal capital, £1,000 in £1 shares. Objects as Goodlass Wall & Co., Ltd.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and two country), except where otherwise stated.

POLAND.—A British subject in Warsaw, with a good knowledge of local market conditions, seeks an agency for British exporters of pharmaceutical products and essential oils. (Ref. No. 56.)

EGYPT.—The Ministry of Finance is calling for tenders to be presented in Egypt by February 1 for the supply of sensitised paper, etc. (ferro-gallate paper and linen and ferro-prussiate paper and linen. (Ref. No. B.X. 6979.)

The Frontiers Administration of the Egyptian Ministry of War and Marine requires tenders in Alexandria by March 14 for the supply of paints, varnishes and compositions. (Ref. No. B.X. 6984.)

Peruvian Imports of Citric and Tartaric Acids

THERE was a large increase in the United Kingdom exports of citric and tartaric acids to Peru in 1929. The total imports of 60,326 lb. into the country during the year represents approximately a 50 per cent. advance over the 1928 figures, as is shown in the following table of imports for the two years:—

Source.	1928 Lbs.	1929 Lbs.
Italy	18,190	23,577
Great Britain	7,247	15,983
Germany	5,863	11,429
United States	3,557	4,602
Other	2,270	4,735
	37,127	60,326